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DEPARTMENT OF DEFENSE APPROPRIATIONS FOR 1995

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Department of Defense Appropriation...

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BEFORE A

SUBCOMMITTEE OF THE
COMMITTEE ON APPROPRIATIONS
HOUSE OF REPRESENTATIVES

ONE HUNDRED THIRD CONGRESS

SECOND SESSION

SUBCOMMITTEE ON THE DEPARTMENT OF DEFENSE

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DEPARTMENT OF DEFENSE APPROPRIATIONS FOR 1995

HEARINGS

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DEPARTMENT OF DEFENSE APPROPRIATIONS FOR 1995

WEDNESDAY, APRIL 13, 1994.

DEFENSE REINVESTMENT AND CONVERSION PROGRAMS

WITNESSES

KENNETH FLAMM, Ph.D., PRINCIPAL DEPUTY ASSISTANT SECRETARY OF DEFENSE FOR ECONOMIC SECURITY

GARY L. DENMAN, Ph.D., DIRECTOR, ADVANCED RESEARCH PROJECTS AGENCY

JEANNE FITES, DEPUTY ASSISTANT SECRETARY FOR REQUIREMENTS AND RESOURCES

INTRODUCTION

Mr. MURTHA. The Committee will come to order.

Today the Committee welcomes Dr. Kenneth Flamm, Principal Deputy Assistant Secretary of Defense for Economic Security and Dr. Gary L. Denman, Director of the Advanced Research Projects Agency (ARPA) to testify on the fiscal year 1995 budget request for Defense Reinvestment and Economic Growth Initiatives. The total request for these programs is $3.4 billion, a slight increase over the fiscal year 1994 request.

Dr. Flamm since this is your first appearance before the Committee, your biography will be placed in the record. If you will briefly summarize your statement we will proceed directly to questioning.

SUMMARY STATEMENT OF DR. FLAMM

Dr. FLAMM. Good morning, Mr. Chairman, and distinguished Members of the subcommittee. I am Ken Flamm the Principal Deputy Assistant Secretary of Defense for Economic Security. I am also the Special Assistant for Dual-Use Technology Policy and International Programs to the Under Secretary of Defense for Acquisition and Technology.

With me today is Dr. Gary Denman, the Director of the Advanced Research Projects Agency or ARPA. We are very pleased to be here this morning to discuss DOD defense reinvestment and conversion programs. Thank you for your invitation. We are going to submit our full statement for the record. I will summarize the major points.

To start, I would like to make a few general observations. We would like to emphasize that the Department's reinvestment and conversion programs are geared towards meeting well-established defense needs.

For example, DOD is focusing on dual-use technologies in order to field state-of-the-art military systems at affordable costs. Declining budgets and global political changes require new approaches, such as the programs that we will discuss today, to meet enduring defense missions. But the overarching goal of all our programs is very familiar—to enhance our military capabilities.

Second, we would like to note that the Department is implementing these programs as aggressively as we can, consistent with need for sound management. We are evaluating existing programs to make sure that they are successful, and considering new programs when we can identify a significant need.

Third, we would like to call your attention to the close cooperation we have within different agencies in implementing reinvestment and conversion programs. DOD is working closely with the Departments of Commerce, Labor, Energy, Transportation, Education, Veterans Affairs and other Federal, State and local agencies. We are also coordinating efforts through the National Economic Council.

Let me turn to the specifics of our major programs. DOD's reinvestment and conversion efforts for the technology industrial base have two major elements. One is dual-use technologies, and the second is acquisition reform.

The first element is a much greater emphasis on dual-use technologies, those with both military and commercial applications. For DOD, dual-use offers the promise of increased capabilities at lower costs as well as dramatic improvements in our ability to take advantage of the Nation's broad industrial base. Encouraging their development and broadening their use are therefore integral to our strategy to continue to provide technologically superior military systems in the era of reduced defense budgets.

Dual-use technologies also offer important benefits to defense companies. By routinely applying their core capabilities in defense and nondefense markets, companies will have an established nondefense business base to expand when defense purchases are reduced.

The largest single defense reinvestment and conversion program within the Department is the Technology Reinvestment Project, or TRP. ARPA leads the TRP with implementation by the multi-agency Defense Technology Conversion Council.

The TRP seeks to stimulate the transition to a growing integrated national industrial capability providing the most advanced affordable military systems and the most competitive commercial products. The President's budget requests $625 million for the TRP in fiscal year 1995. To date, the TRP has selected 212 proposals, with Federal commitments totaling $605 million.

These proposals involve over 1,600 organizations in 46 States, the District of Columbia and six countries. Since each of these efforts requires cost sharing of at least 50 percent, this represents a total project value of almost $1.5 billion.

On April 8, 1994, the TRP issued a second solicitation for proposals. This solicitation focused on the following technology areas: High density data storage systems; object-oriented technology for rapid software development and delivery; interoperability testbeds for the national information infrastructure; high-definition systems manufacturing; low-cost electronic packaging; uncooled infrared sensors; and environmental sensors. This competition should use about $150 to $180 million of fiscal year 1994 TRP funding.

ARPA and the other TRP agencies plan a third solicitation during the June 1994 time period. This solicitation will be a larger, more general competition which will use the remainder of the fiscal year 1994 TRP funds and a substantial portion of the $625 million requested for fiscal year 1995.

DOD is carrying out a variety of dual-use technology programs in addition to the TRP. The President's budget requests about $1.5 billion for other dual-use initiatives in the 1995 fiscal year. These efforts are concentrated in areas that have a potentially high payoff in military and commercial applications, such as electronics and materials, manufacturing technology, and computing systems and communications technologies.

A new dual-use reinvestment program will encourage Federal defense laboratories and companies to pursue the insertion of commercial technologies into military systems and the commercialization of technologies developed within the defense sector. In addition, a new Navy Dual-use Technology Program seeks to develop and deploy dual-use products and processes with particular relevance to Navy requirements.

There are, of course, limits to dual use. Some essential capabilities are unique to defense and must be maintained. The Department is identifying these essential defense-unique capabilities and developing ways to support them through appropriate industrial base policies.

The second element of our approach is acquisition reform. The effectiveness of our reinvestment and conversion efforts will be severely limited without meaningful acquisition reform. Removing the Government-unique barriers that separate defense and commercial business will reduce acquisition costs and facilitate defense reinvestment and conversion.

COMMUNITY ASSISTANCE PROGRAMS

Let me talk briefly about community adjustment and assistance. The Department's programs for communities have two areas of concentration. First, we are helping communities adjust to reductions in local defense spending. Second, we are helping communities meet important needs when doing so is consistent with DOD missions.

We have vastly increased both the size and scope of our community adjustment programs to respond to the new challenges of defense spending reductions and base closures. Our approach to community adjustment is based on providing resources to local communities so that they can chart their own course for revitalization, rather than imposing solutions crafted in Washington.

For communities with closing or realigning military installations, we are aggressively implementing President Clinton's five-part plan for revitalizing base closure communities. The Department, through its Office of Economic Adjustment, is also increasing efforts to work with communities that have been affected by cutbacks in defense industries.

We are also implementing special programs to help communities meet pressing needs in specific areas like education, training, health care and the environment, and are encouraging former military personnel to take jobs in teaching, law enforcement, and other areas in public and community service. The President's budget for fiscal year 1995 requests $170 million for community-related assistance.

PERSONNEL ASSISTANCE PROGRAMS

One final area I would like to mention is personnel assistance. One of our greatest challenges is to maintain ready and balanced forces during the drawdown. Our personnel assistance programs are designed to do just that, through minimizing involuntary separations, honoring voluntary choices of career personnel, providing needed separation benefits and offering effective transition assistance.

To limit involuntary separations of military personnel we have relied upon reduced accessions, attrition and incentive programs to encourage voluntary separations of selected career personnel. We also seek to minimize involuntary separations of civilian personnel through incentive programs. In addition, the Department is continuing to implement transition assistance programs for both military personnel and civilian employees.

The President's budget for fiscal year 1995 includes almost $1.1 billion for personnel assistance initiatives.

In conclusion, the Department's reinvestment and conversion programs represent new approaches to meeting long-standing defense requirements. These programs will not only help smooth the transition to lower levels of defense spending, but will also improve defense research, acquisition and force management.

We hope that the Congress will continue to support our efforts by endorsing the President's fiscal year 1995 budget for these programs.

Gary and I stand ready to answer your questions. I would like to turn to Gary and ask if he would like to add anything.

SUMMARY STATEMENT OF DR. DENMAN

Dr. DENMAN. I believe that the Technology Reinvestment Project, the TRP, has created an enormous amount of interest and excitement around the country, mainly in the form of collaboration between small business, large business, local governments, and local community and regional activities.

One of the things we want to keep our eye on is sustaining that excitement around the country. We are concerned about the fact that the response was much larger than we could fund with the 1993 funds.

We were able to fund about seven percent of the proposals received. We are holding meetings around the country and we plan to hold workshops, et cetera, to keep the excitement going and to keep the collaboration going between government and industry, and within industry. So I look forward to moving forward in 1994 and 1995 with this program.

[The joint statement of Dr. Flamm and Dr. Denman follows:]

STATEMENT OF

KENNETH S. FLAMM
PRINCIPAL DEPUTY ASSISTANT SECRETARY OF DEFENSE
(ECONOMIC SECURITY) AND
SPECIAL ASSISTANT TO THE UNDER SECRETARY OF DEFENSE
(DUAL USE TECHNOLOGY POLICY AND
INTERNATIONAL PROGRAMS)

AND

GARY L. DENMAN
DIRECTOR, ADVANCED RESEARCH PROJECTS AGENCY

BEFORE THE

SUBCOMMITTEE ON DEFENSE
COMMITTEE ON APPROPRIATIONS
U.S. HOUSE OF REPRESENTATIVES

DEFENSE REINVESTMENT AND CONVERSION
APRIL 13, 1994

NOT FOR PUBLICATION
UNTIL RELEASED BY THE
COMMITTEE

Kenneth S. Flamm

Dr. Kenneth Flamm was appointed Principal Deputy Assistant Secretary of Defense (Economic Security) and Special Assistant to the Under Secretary of Defense (Acquisition) for Dual Use Technology Policy and International Programs on September 1, 1993. Dr. Flamm advises the Under Secretary on technology policy and industry assessments, the impacts of dual use and international technology policy and production programs, and international trade and investment policies affecting the technology and industrial base. He serves as representative of the Under Secretary at interagency and intergovernmental activities at which such policies are determined. He is also the principal advisor to the Under Secretary and the Assistant Secretary on all matters relating to Defense policies in the areas of dual use technology, cooperative research and development, production, procurement and follow-on support programs with foreign nations, technology transfer, and the technology and industrial base.

Previously, Dr. Flamm was a Senior Fellow in the Foreign Policy Studies Program of the Brookings Institution. He also served as adjunct professor of economics and international affairs at George Washington University. Dr. Flamm's public service included work as advisor to the Director General of Income Policy in the Mexican Ministry of Finance and consultant to the Organization for Economic Cooperation and Development, the World Bank, the National Academy of Science, the Latin American Economic System, the U.S. Department of Justice, the U.S. Agency for International Development, and the U.S. Congress Office of Technology Assessment. He has also served on expert advisory panels of the National Science Foundation, the National Research Council, and Office of Technology Assessment.

Dr. Flamm's research at Brookings, focused on international competition in high technology industries, has produced numerous articles and books. In the Global Factory (Brookings, 1985, written with Joseph Grunwald) he examined foreign assembly arrangements in a diverse group of industrial products (the most important of which was semiconductors). In Targeting the Computer (Brookings, 1987) and Creating the Computer (Brookings, 1988), he analyzed the economic history of the international computer industry and assessed the impact of government policy on the development of computer technology in the United States, Western Europe and Japan. Along with Robert Crandall of the Economic Studies Program, he edited and contributed to Changing the Rules (Brookings, 1989), a conference volume which examined the impacts of technological change, internationalization, and deregulation on the structure of the computer and communications industries. Dr. Flamm has recently completed a comprehensive study of trade policy and international competition in the semiconductor industry.

Dr. Flamm received an A. B. (Honors) in economics from Stanford University and a Ph.D. in economics from the Massachusetts Institute of Technology.

Good morning, Mr. Chairman and distinguished members of the subcommittee. I am Kenneth Flamm, the Principal Deputy Assistant Secretary of Defense for Economic Security. I am also the Special Assistant for Dual Use Technology Policy and International Programs to the Under Secretary of Defense for Acquisition and Technology. With me today is Dr. Gary Denman, the Director of the Advanced Research Projects Agency, or ARPA. We are pleased to be here this morning to discuss the Department of Defense's (DoD) defense reinvestment and conversion programs.

Before discussing the specifics of the Department's programs, we would like to make some general observations.

First, we would like to emphasize that the Department's reinvestment and conversion programs are geared toward meeting well-established defense needs. For example, DoD is focusing on dual-use technologies in order to field state-of-the-art military systems at affordable costs, offering separation incentives to maintain readiness while we manage the drawdown of our forces, and helping communities plan their adjustment to changes in local defense spending, a task we have been carrying out for over 30 years. Declining budgets and global political changes require new approaches, such as the programs that we will discuss today, to meet enduring defense missions. But the overarching goals of these programs are familiar.

Second, we would note that the Department is committed to these programs. DoD is implementing them as aggressively as we can, consistent with the need for sound management. The Department is evaluating existing programs to make sure that they are successful, and considering new programs when we identify the need.

Third, we want to call your attention to the close cooperation we have within different agencies in implementing reinvestment and conversion programs. DoD is working closely with the Departments of Commerce, Labor, Energy, Transportation, Education, Veterans Affairs, and other federal agencies, and the Administration is coordinating efforts through the National Economic Council. We are capitalizing on strengths throughout the Executive Branch and minimizing wasteful duplication. In addition, we are working closely with many state and local government organizations.

Let us now turn to the specifics of our programs.

DUAL-USE TECHNOLOGIES AND ACQUISITION REFORM

DoD's defense reinvestment and conversion efforts for the technology and industrial base have two elements. First, the Department is placing a much greater emphasis on dual-use technologies--those with military **and** commercial applications. Dual use offers key benefits to DoD, to defense companies, and to taxpayers. Second, we are pursuing acquisition reform. The effectiveness of our reinvestment and conversion efforts will be severely limited without meaningful acquisition reform.

Benefits of Dual Use to DoD

Because dual-use technologies offer increased capabilities at lower costs, as well as dramatic improvements in our ability to take advantage of the nation's industrial base, encouraging their development and broadening their use are integral parts of our strategy to continue to provide technologically-superior military systems in an era of reduced defense budgets.

In many areas that are important to defense, commercial capabilities exceed military-unique ones. By taking better advantage of the state-of-the-art in commercial technologies, DoD will be able to shorten development times and field more advanced systems. Moreover, commercial capabilities will usually offer cost advantages over military-unique ones because they must be priced competitively to survive in the marketplace.

A greater emphasis on dual use also allows the Department to draw upon a larger, more flexible, and more responsive industrial base. By relying more on dual-use capabilities, DoD will be able to draw from a larger portion of the nation's entire industrial base, rather than the narrow segment that is devoted solely to defense. In peacetime, this means that DoD will be able to access a vastly increased array of technologies. During a war or crisis, this means DoD will be able to take advantage of strengths throughout the nation's industrial infrastructure, rather than the more limited option of increasing production at plants dedicated to defense.

Benefits of Dual Use to Defense Companies

Emphasizing dual-use technologies also offers important benefits to defense companies. Encouraging non-defense uses of defense capabilities will make it easier for companies to diversify in response to lower defense procurement. Diversification efforts are more likely to succeed when companies enter markets that take advantage of their core capabilities. By routinely applying their core capabilities in defense and non-defense markets, companies will have an established non-defense business base to expand when defense purchases are reduced. In many cases, defense industries are forming strategic alliances with commercial companies to obtain market access. We in DoD must look to industry to make their own decisions to diversify and build alliances; we cannot nor should we attempt to drive these decisions.

Benefits of Dual Use to Taxpayers

The dual-use approach also benefits taxpayers by increasing the nation's return on investments in defense research and development. From the outset, research will be geared to improving industrial capabilities in key areas critical to meeting defense requirements. By drawing on the larger volumes and economies of scale created in commercial markets, Defense will lower the costs of the capabilities it requires. Less expensive products and technologies will be affordable in a wider range of military applications, improving the overall quality and capabilities of our systems and forces. Our dual-use efforts will also increase the benefits that defense research brings to the nation's economy.

Importance of Acquisition Reform

To be fully successful, our increased emphasis on dual-use technologies must be accompanied by meaningful acquisition reform. Over the years, we have built a complex of statutes, regulations, and ways of doing business that has isolated defense work from its commercial counterpart. Removing the barriers that separate defense and commercial business will reduce acquisition costs and facilitate defense reinvestment and conversion. The Department can accomplish acquisition reform while continuing to guard against waste, fraud and abuse, and we seek your strong support of our acquisition reform initiatives.

Limits to Dual Use

There are, of course, limits to the dual-use approach. Some essential capabilities are unique to defense and must be maintained. The Department is identifying these capabilities and developing ways to support them through appropriate industrial base policies. While much work remains to be done in this area, we are taking actions to safeguard essential, defense-unique portions of the industrial base, as evidenced by the request for funding a third SSN-21 Seawolf submarine in FY 1995.

Technology Reinvestment Project

The Department's largest single dual-use reinvestment and conversion program is the Technology Reinvestment Project, or TRP. ARPA leads the TRP, with implementation by the multi-agency Defense Technology Conversion Council, whose members include ARPA (Chair), the Departments of Commerce, Energy, and Transportation, the National Aeronautics and Space Administration, and the National Science Foundation. Through awards for technology development, technology deployment, and manufacturing education and training, the TRP seeks to stimulate the transition to a growing, integrated, national industrial capability which provides the most advanced, affordable, military systems and the most competitive commercial products. The President's budget requests $625 million for the TRP for FY 1995.

The TRP is rooted in the doctrine that our defense strategy depends on maintaining technological supremacy over those who threaten our security. Its ultimate objective is to preserve defense access to our most critical technologies even where the DoD can no longer afford to be the primary investor. It builds heavily on the recognition that much of the same advanced technology required by defense has great commercial potential which, in turn, will stimulate application of private sector expertise and investment. Consequently, we will vigorously pursue dual-use technologies with both purposes in mind from the very beginning. We have three major objectives:

- First, we want to reduce significantly the time and expense required to develop and mature critical defense technologies by attracting the interest and resources of the commercial sector to work with us as partners with common interests and shared risk--a dual-use development strategy.

- Second, we want to build a "dual-produce" capability in the U.S. manufacturing base by deploying new manufacturing technologies and methodologies that allow military products to be produced alongside commercial versions of the same product. By deploying these new techniques, especially to small- and medium-sized firms, we intend to exploit existing, high-volume commercial markets to provide critical technologies back to defense at a price that is affordable.

- Finally, we hope to educate a whole new generation of manufacturing experts which will come to know "dual-use" and "dual-produce" as the routine way of doing business.

Although the TRP implements eight different statutory programs, four requirements are common to all TRP activities. First, all TRP awards are selected through merit-based competitions. Second, there is a strong emphasis on partnerships. Third, TRP recipients must share at least 50 percent of total costs. This is an especially important requirement because it brings industry's business judgment to bear on TRP projects. Finally, TRP programs must be relevant to defense needs.

To date, the TRP has selected 212 proposals, with federal commitments totalling $605 million. These proposals involve over 1,600 organizations in 46 states, the District of Columbia, and six countries. Since each of these efforts requires cost sharing of at least 50 percent, this represents a total project value of almost $1.5 billion.

On April 8, 1994, the TRP issued a second solicitation for proposals. This solicitation focuses on the following technology areas: High Density Data Storage Systems; Object Oriented Technology for Rapid Software Development and Delivery; Interoperability Testbeds for the National Information Infrastructure; High Definition Systems Manufacturing; Low Cost Electronic Packaging; Uncooled Infrared Sensors; and Environmental Sensors. This competition should use about $150-$180 million of FY 1994 TRP funding.

ARPA and the other TRP agencies plan a third solicitation during the June time period. This solicitation will be a larger, more general competition, which will use the remainder of the FY 1994 TRP funds and a substantial portion of the $625 million requested for FY 1995.

Although a final assessment of the TRP is years away, we would like to share with you observations based on our experience to date. First, the cooperation among the federal agencies executing the TRP is unprecedented and outstanding. Second, the response to the TRP's first solicitation was surprisingly strong. The number of excellent proposals we received exceeded the available funding. Third, we are pleased with the teaming arrangements of program participants. The teams reflect meaningful and unique collaborations, with government, universities, and industry, especially small businesses, well-represented. Fourth, the program has been well-received at all levels of government, as evidenced by the active participation of state and local governments. In sum, we believe that the TRP's innovative dual-use programs, workforce retraining, and infrastructure support marks a promising start to integrating the military and commercial industrial base. ARPA and the other TRP agencies will continue to monitor progress as the program proceeds.

Other Dual-Use Programs

DoD is carrying out a variety of dual-use technology programs in addition to the TRP. The President's budget requests about $1.5 billion for other dual-use initiatives for the 1995 fiscal year. These efforts are concentrated in areas that have a potentially high pay-off in military and commercial applications, such as electronics and materials, manufacturing technology, and computing systems and communications technologies. A new dual-use technology application program will encourage federal defense laboratories and companies to pursue the insertion of commercial technologies into military systems and the commercialization of technologies developed in the defense sector. In addition, the new Navy Dual-Use Technology Program seeks to develop and deploy dual-use products and processes with particular relevance to Navy requirements.

COMMUNITY ADJUSTMENT AND ASSISTANCE

The Department's programs for communities have two areas of concentration. First, we are helping communities adjust to reductions in local defense spending. Second, we are helping communities meet important needs when doing so is consistent with DoD missions. The President's budget for FY 1995 requests $170 million for these activities.

Community Adjustment

DoD has vastly increased the size and scope of its community adjustment programs to respond to the new challenges of defense spending reductions and base closures.

Our approach to community adjustment is based on providing resources to local communities so that they can chart their own course for revitalization, rather than imposing solutions from Washington. Local communities are the best judges of their strengths and opportunities. DoD's Office of Economic Adjustment (OEA) is the focal point for community adjustment activities.

For communities with closing or realigning military installations, we are aggressively implementing President Clinton's five-part plan for revitalizing base closure communities. The five central elements of the President's plan are:

- Jobs-centered property disposal that puts local economic development first
- Fast-track cleanup that removes needless delays while protecting human health
- Transition coordinators at major bases for closure
- Easy access to transition and redevelopment help for workers and communities
- Larger economic development planning grants to base closure communities

To help implement the President's plan, the Department established the Base Transition Office (BTO). The BTO supports the work of the transition coordinators at closing major bases. DoD currently has 67 base transition coordinators in the field tasked with serving as advocates for local communities to identify and integrate community reuse needs.

While the task of remaking the economic foundation of communities affected by base closures is never easy, base land and facilities--previously inaccessible--can be communities' single greatest asset in charting a different future. The President's initiative will give local communities the funds and technical assistance necessary to suitably use these assets and plan for the future. Through March 1994, base reuse activities have replaced over one-third of the civilian positions that were lost at the military bases that have closed to date as a result of 1988 and 1991 base realignment and closure decisions, and we expect the number of new jobs to increase in the coming months.

The Department, through OEA, is also increasing its efforts to work with communities that have been affected by cutbacks in defense industries. A conference held last week in Washington is indicative of OEA's new efforts. OEA gathered together about 200 state and local officials, community activists, and experts from academia, the Federal government, and business to discuss the challenges and opportunities facing communities with reductions in defense industries.

Community Assistance

DoD is also implementing special programs to help communities meet pressing needs in specific areas such as education, training, health care, and the environment. The Department has expanded the Junior Reserve Officers Training Corps (JROTC) program, which instills within high school students responsibility, values, self-esteem, discipline, and citizenship. We have established JROTC Academies which provide "at-risk" inner-city high school students with a career-focused program that emphasizes graduation, vocational skills development, and values. The National Guard has developed the Civilian Youth Opportunities Pilot Program, which addresses the academic and other needs of youth including drop-outs. The Guard also is providing health care assistance to medically under-served communities under a new program called Guardcare. The Department is providing funds to establish fellowships, scholarships, and grant programs in environmental remediation at institutions of higher education. DoD is also assisting the Congress and the President in implementing national service with funding, personnel, facilities, and technical assistance. Many of these initiatives include encouraging former military personnel to take jobs in teaching, law enforcement, and other areas in public and community service.

PERSONNEL ASSISTANCE

One of the Department's greatest challenges is to maintain ready and balanced forces during the drawdown. Our personnel assistance programs are designed to do just that, through minimizing involuntary separations, honoring the voluntary choices of career personnel, providing needed separation benefits, and offering effective transition assistance. The President's budget for FY 1995 includes almost $1.1 billion for personnel assistance initiatives.

Military Personnel

As we reduce and reshape our forces, the Department's challenge is to maintain a high state of readiness and to treat service members fairly--both those who leave and those who stay. Because of the adverse effects of involuntary separations, the Department seeks to achieve necessary reductions in strength on a voluntary basis to the maximum extent possible. To limit involuntary separations, we have relied upon reduced accessions, attrition, and incentive programs to encourage voluntary separations of selected career personnel. The incentive programs include the Voluntary Separation Incentive (VSI) program, the Special Separation Benefit (SSB) program, and the Temporary Early Retirement (TERA) program, which offers reduced retirement benefits to selected personnel with more than 15 but fewer than 20 years of service. Our approach has been extremely successful. Active duty end strength has declined by over 500,000 since 1987, with very few involuntary losses, only about 2,000 reductions in force (RIFs).

The Department is continuing to implement transition assistance programs for those who separate from the military. These programs include the Transition Assistance Program seminars and individual pre-separation counseling for separating personnel and their spouses, a database of resumes (the Defense Outplacement Referral Service or DORS), and a database of job openings (the Transition Bulletin Board or TBB). The Department is also expanding access to the Department of Labor's America's Job Bank (AJB), another database of job openings.

Civilian Personnel

The Department also seeks to minimize involuntary separations of civilian personnel. DoD is offering up to $25,000 to selected civilian personnel who retire or resign. These incentives, like those for military personnel, will help reduce the size of the civilian workforce. In addition, the Department is offering early retirement to civilian employees in organizations undergoing major reductions.

DoD also administers programs to help civilians find new jobs. Under DoD's Priority Placement Program, civilian employees who are at risk of losing their jobs may be offered placement in vacant positions for which they are qualified. Civilians may also list their resumes on the DORS computerized resume bank and look for employment on the TBB and the AJB computerized listings of job openings. DoD can help defray moving costs for employees who must relocate because they are placed in new DoD jobs due to the drawdown. Many separating civilian employees are also eligible to participate in employment assistance programs administered by the Department of Labor, and may participate in the Transition Assistance Program seminars.

CONCLUSION

The Department's reinvestment and conversion programs represent new approaches to meeting long-standing defense requirements. These programs will not only help smooth the transition to lower levels of defense spending, but will also improve defense research, acquisition, and force management. We hope that the Congress will continue its support of our efforts by endorsing the President's 1995 budget for these programs, and stand ready to answer your questions.

FIVE YEAR BUDGET FOR DEFENSE CONVERSION

Mr. MURTHA. We appreciate the importance that you place on conversion, but at some point the community has to rely on itself. I certainly agree that there are all kinds of needs out there. When we take away the tremendous resources of the Federal Government, we should help with the transition. What do you see overall funding for a five-year period?

Dr. FLAMM. I don't have the numbers immediately available. I would be happy to supply them.

Mr. MURTHA. Provide that for the record.

[The information follows:]

DEPARTMENT OF DEFENSE REINVESTMENT AND CONVERSION

[Budget authority in millions of dollars]

Program	Proposed				
	1995	1996	1997	1998	1999
Technology reinvestment project	625	650	675	700	725
Other dual-use technology	1,523	[1]1,523	[1]1,523	[1]1,523	[1]1,523
Personnel assistance and community support	1,254	[1]1,254	[1]1,254	[1]1,254	[1]1,254
Total	3,402	3,427	3,452	3,477	3,502

[1] This is the 1995 level. Specific estimates for 1996 through 1999 are not yet available.

DUAL-USE TECHNOLOGY PRIORITIES

Mr. MURTHA. What dual-use projects and technology are critical?

Dr. FLAMM. The way we go about looking at dual use is to start first with military requirements. I think it is important to understand we have an overall vision of where we are going. Wherever possible, we will try to rely on commercial products, technologies and systems to insert into military systems.

The rationale for that is twofold: One, in many areas important to defense today, the overall rate of innovation, the rate at which technology is being fielded, is actually higher in the commercial world, because of its reduced cycle times than in the defense world. I would emphasize the frenetic pace of commercial innovation in areas like computers and semiconductors, where products come on board every three years. Compare that with our traditional defense cycle, where it takes about 10 or 15 years to field a new system. It is clear, then, that if we can tap into commercial products and technologies, we will have a higher pace of innovation in defense systems.

The second issue is affordability. In many respects, the department can get more affordable systems with similar functionality by tapping into commercial standards and products.

So our overall strategy is to find areas, wherever possible, where we can employ commercial products, technologies and systems as building blocks for military systems. By tapping into these commercial products and systems, using them within our military systems, we think we can improve both the capability and the effectiveness of our military systems and actually lower the cost of fielding the forces we need for defense. That is the overall strategy for dual use.

If you are asking where we think the specific areas are where we can do that most effectively, I can list some ideas that we have pinpointed as productive directions to pursue; i.e., computers, electronics, and advanced communications systems.

Mr. DICKS. Give us examples of projects that have been funded.

Dr. FLAMM. Some of the proposals that are responded to in the latest TRP solicitation are good examples.

Dr. DENMAN. Electronic packaging is one example. Another one that will have a major impact is a sizable program in engines—applying composite materials to engines. This is a large consortium, or partnership, among Pratt-Whitney and their suppliers. The work will be done by their suppliers to build a capability to move composites into engines. The composites will probably go first into commercial engines but they will also be inserted into military engines. That is the kind of project where we are getting application in both defense and non-defense markets simultaneously. The same is true in electronic packaging?

Mr. DICKS. What is electronic packaging?

Dr. DENMAN. It is the step between making a chip and putting it into an electronic circuit, where you have to put the chip into some sort of a package to carry it.

The next step is integration in electronics, new ways to do this which the commercial market is desperately seeking. Electronic packaging is critical for performance as well as cost in the military markets. We have some very aggressive partnerships working this area.

Mr. DICKS. Are we getting these companies to put up their money as well?

Dr. DENMAN. Absolutely. Minimum 50 percent cost-share. Because we had such a wide response to these proposals, we were able to essentially select those programs that were cost-shared with cash. We were offered $4 billion in cash cost sharing in all proposals, cash, not in-kind, but cash to contribute as partners with the government in these proposals.

Mr. MURTHA. Mr. McDade.

PERSONNEL ASSISTANCE PROGRAMS

Mr. MCDADE. Thank you, Mr. Chairman. Thank you both for your testimony.

About $1 billion of your budget, as I understand it, is devoted to military and civilian employee transition. Is that the number for fiscal year 1995?

Dr. FLAMM. That sounds roughly in the ball park. I can look up the number or submit it for the record.

Mr. MCDADE. You may supply it for the record.

[The information follows:]

The FY 1995 budget request for Personnel Assistance Programs is $1,083.6 million.

Mr. MCDADE. Give us a summary of some of the ongoing employment, financial, separation and training assistance programs being provided to civilian and military personnel, please. Tell us what you are doing.

Dr. FLAMM. We have a large variety of programs. I can just tell you some of the ones off the top my head, and I would be happy to submit a complete list of such programs.

[The information follows:]

Program	Description	Participation	Comments
Pre-separation Counseling and/or Employment Assistance	Pre-separation counseling and employment to Service members	FY 93: 667,080	Number of visits by Service member to receive transition services
Transition Assistance Program (TAP) Workshops	3-day collaborative workshops on employment assistance involving Departments of Defense, Labor, and Veterans Affairs	FY 93: 185,092	Number of Service members and spouses who participated in TAP workshops
		FY 93: 4,376	Number of TAP workshops
Defense Outplacement Referral System (DORS)	A computer-based mini-resume and referral system that is maintained by DoD and is available to employers	FY 93: 80,161	Number of personnel registered on the DORS
		FY 93: 333,591	Number of DORS mini-resumes referred to employers per their request
		FY 93: 377	Number of DoD civilians placed in other Federal agencies through DORS

Program	Description	Participation	Comments
Transition Bulletin Board (TBB)	An electronic bulletin board accessible at 330 transition offices worldwide that displays want ads, business opportunities, a calendar of events (such as job fairs, workshops, employment seminars), and information about Veteran Service organizations, education, and training opportunities.	FY 93: 3,959	Number of want ads listing job vacancies on the TBB
Temporary Early Retirement	Reduced retirement benefits to selected military personnel with between 15 and 19 years of experience	FY 93 Actual: 555 FY 94 Estimate: 11,700	
Voluntary Separation Incentive	Annuity offered to selected military personal with between 6 and 19 years of experience	FY 93 Actual: 5,000 FY 94 Estimate: 2,000	
Special Separation Bonus	One-time payment to selected military personnel with between 6 and 19 years of experience	FY 93 Actual: 19,000 FY 94 Estimate: 11,600	
Separation Pay and Civilian Health Benefits	Separation pay, incentives, and health benefits for civilian DoD employees	Civilian Separation Incentives FY 93: 32,000	
Temporary Military Health Transition Assistance	Temporary health insurance for separating military personnel		Statute requires implementation by October 1, 1994.
Guard and Reserve Transition Initiatives	Various transition initiatives for members of the Guard and Reserve	FY 93: 8,739	Recipients of Separation Pay and Special Separation Pay

Program	Description	Participation	Comments
Civilian Priority Placement Program	Civilian employees who are at risk of losing their jobs may be offered placement in vacant DoD positions for which they are qualified	FY 93: 6,115	
Troops to Teachers	Encourages former defense personnel to obtain certification and teach in schools in low income communities	As of April 1994 5,000 Inquiries 1,191 Applications 300 stipends awarded	
DoD Environmental Program	Scholarship and fellowship programs to enable individuals to qualify for employment in environmental restoration or other environmental programs in DoD	About 100 scholarships and 30 fellowships in the first year of implementation; further participation to be determined	Section 4451 of the FY 93 Authorization Act limits participation to not more than 100 scholarships and 30 fellowships in the first year. Actual participation will be determined by the institutions of higher education that will implement the program.
Service Member Occupational Conversion and Training	Employment training for veterans whose skills do not readily transfer to civilian employment, administered by the Departments of Veterans Affairs and Labor	Applications processed for benefits FY 94: 29,737 Number eligible: FY 94: 25,459	Program is being implemented by the Departments of Veterans Affairs and Labor

Dr. FLAMM. The Troops-to-Teachers Program and Troops-to-Law-Enforcement Program are examples of separation programs for military personnel designed to ease transition. We work with the Department of Labor on placement of personnel who are being separated from the Department of Defense. We have a wide variety of programs.

Mr. McDADE. Would you describe it as a job training program, primarily?

Dr. FLAMM. We have some agencies which provide skills. I believe that we often——

Mr. McDADE. You are asking the Committee for over a billion dollars. We need to get a bird's-eye view of exactly what it is that assists a civilian or someone in the military who is caught in the drawdown.

What do you do to help them? Tell us how the process works and tell us what you do.

Dr. FLAMM. I think the place to start is to understand that we have an inevitable process of reducing personnel levels. So the question is how can DOD most assist the personnel caught up in that transition.

I think there are a number of issues which come to mind. One is a question of skills, to what extent can skills that were developed for military purposes within our defense forces be retooled or converted to areas that are crucial in civilian life.

Troops to Teachers is a good example. In other cases, we have broader problems of finding ways to give people needed skills to reenter the job market. We have programs which meet that objective.

In other cases, it is a question of getting people information about job markets, about job opportunities, about plugging them into networks that give them information about where they can find employment opportunities, given their skills, and there are programs which address that.

Mr. McDADE. Doesn't the Labor Department do that as a matter of course now?

Dr. FLAMM. It certainly does, and we support some of the Labor Department's efforts——

TRANSFER OF FUNDS TO OTHER AGENCIES

Mr. McDADE. You transfer money to the Labor Department?

Dr. FLAMM. In the past we have. We work with the Labor Department. We try to put together action teams, for example.

Mr. McDADE. How much money last year did you pass through to the Department of Labor? Provide for the record the amount of transfers that you have made to any Departments of Federal Government last year, how much it was. We have to make sure we are on the same score card. Put that in the record for us.

Mr. MURTHA. Let's have that information before we go to markup. Send it to us right away.

[The information follows:]

Agency	Dollar amount in millions	Date released in 1993	Program
Department of Commerce	80	March	Economic Development Administration Community Adjustment.
Department of Labor	75	March	Defense Diversification Program.

Agency	Dollar amount in millions	Date released in 1993	Program
Department of Veterans Affairs	73.5	March	Service Members Occupational Conversion and Training Act.
Department of Labor	1.5	March	Service Members Occupational Conversion and Training Act.
Commission on National and Community Service.	40	April	National Civilian Community Corps ($20 million) and other programs ($20 million).
Department of Labor	4	July	America's Job Bank (formerly Interstate Job Bank).

Dr. FLAMM. We will get that to you as quickly as possible.

Mr. MCDADE. What was your total appropriation last year for personnel assistance programs?

Dr. FLAMM. I would have to check the number. I think it was on the order of $1 billion, but I would hate to give you an inaccurate answer.

Mr. MCDADE. You can amend it for the record. What is your ballpark best estimate of how much money you got last year.

Dr. FLAMM. I thought it was about a billion; $950 million.

Mr. MCDADE. A billion here, a billion there, soon it becomes real money?

Dr. FLAMM. No, sir.

Mr. MCDADE. How much of that was transferred through to other Departments of the government?

Dr. FLAMM. A relatively small portion of that, I believe; about 20 percent, I am told.

Mr. MCDADE. How many people——

Mr. DICKS. Does your staff have the numbers? Maybe they could give us the numbers.

Dr. FLAMM. I am not sure we have the actual numbers here.

Mr. MCDADE. With the permission of the Chair, you can amend your statement for the record. We are trying to get a sense of what you are doing in the hearing.

[The information follows:]

	Percent
FY 93 and FY 94 personnel and community reinvestment and conversion funds released to other agencies—$274 million	11.8
FY 93 and FY 94 personnel and community reinvestment and conversion funds retained in DoD—$2,052 million	88.2
Total FY 93 and FY 94 community and personnel reinvestment and conversion funds—$2,326 million	100

Ms. FITES. $75 million was transferred to Department of Labor and Veterans' Administration for a training program.

I am Jeanne Fites, Deputy Assistant Secretary for Requirements and Resources.

$75 million was transferred, most of it to Department of Veterans Affairs, a very small portion to the Department of Labor for the Service Members Occupational Conversion and Training Act, which is to help people that do not have skills transferable to civilian life, get skills and training from employers with guaranteed employment to follow. A total of $40 million was transferred to the Corporation for National and Community Service. Twenty million went to the Civilian Community Corps, and $20 million went into other programs. That is where the transfers were.

Mr. McDADE. After these transfers take place, do you get a report back? How is the control of the money handled after you make the transfer. Do you continue to control the money?

Ms. FITES. We do not.

Mr. McDADE. So after you transfer the money, it is within the discretion of whoever gets it?

Ms. FITES. Yes.

Mr. McDADE. Are you able to tell us, doctor, how many people with that billion dollars did you impact? How many people did you have come before you for assistance?

Dr. FLAMM. I can't give you a precise answer on that.

Mr. McDADE. Do you have a number?

Ms. FITES. Since the beginning of the drawdown, we have reduced the military forces by 500,000 people, the civilians by the end of 1999 will have come 327,000, which is roughly 29 percent. So we are—and most of the——

Mr. McDADE. How many of those people of that 800,000, roughly, did your office interface with?

Ms. FITES. Everyone is offered a variety of services from a resume and, documentation of military training, to help them find a job, to access to computerized job bases.

Mr. McDADE. Do you have records of the number of people who actually got jobs as a result of your efforts?

Ms. FITES. We have a partial record. I don't have it with me. I will provide it.

[The information follows:]

We do not have a record of how many people actually got jobs; however, the following information shows such information as the number of resumes referred to employers per their request (333,591 in FY 1993), number of applications processed for job training benefits under the provisions of the Servicemembers Occupational Conversion and Training Act (SMOCTA) (29,737 in FY 1995), etc.

PERSONNEL TRANSITION PARTICIPATION

Number of visits by Service members to receive transition services (preseparation counseling and/or employment assistance): 667,080 fiscal year 1993)

Number of Service members and their spouses participating in 3-day Transition Assistance Program (TAP) workshops. The workshops are collaborative efforts involving DoD, DoL, DVA: 185,092 (fiscal year 1993)

Number of TAP workshops that focused on employment assistance: 4,376 (fiscal year 1993)

Number of personnel registered on the Defense Outplacement Referral System (DORS). DORS is a mini-resume registry and referral system that is maintained by DoD and available to employers: 80,161 (fiscal year 1993)

Number of resumes referred to employers per their request: 333,591 (fiscal year 1993)

Number of want ads listing job vacancies on the DoD transition Bulletin Board (TBB). TBB is an electronic bulletin board accessible at more than 330 transition offices worldwide. It displays want ads; business opportunities; a calendar of events (such as job fairs, workshops, employment seminars); and information about Veteran Service Organizations, education, and training opportunities: 3,959 (fiscal year 1993)

Number of verification documents (DD Form 2586) printed and distributed. This form provides a summary of the Service member's military occupation and training history: 610,298 (fiscal year 1993)

Number of applications processed for job training benefits under the provisions of the Servicemembers Occupational Conversion and Training Act (SMOCTA): 29,737 (fiscal year 1994)

Number of veterans eligible for job training benefits under SMOCTA: 25,459 (fiscal year 1994)
Amount of funds currently available for SMOCTA benefits: $65M (fiscal year 1993)
Amount of funds committed to SMOCTA benefits: $15.73M (fiscal year 1994)
Number of "Troops to Teachers" applications received as of the end of March (FY94). A total of 550 individuals are eligible for a stipend, and 205 are eligible for a grant only: 1,171 (fiscal year 1994)

MENTOR PROTEGE AND LABORATORY DIVERSIFICATION PROGRAMS

Mr. McDade. Let me ask you this question: There is an item that is listed for the Washington Headquarters Service. What is the Washington Headquarters Service?

Dr. Flamm. The Washington Headquarters Service is the actual administration of the Pentagon and the headquarters offices.

The item you are referring to—are you referring to our reinvestment program that is labeled as Washington Headquarters Services?

Mr. McDade. There is an item of $106 million here. What is that?

Dr. Flamm. That is broken down to two components. I believe approximately $65 million of that is the Mentor Protege Program which is a program that seeks to impart useful skills to smaller businesses that work with larger contractors on defense-related procurement, and so that is about $65 million. That is a way for large contractors to work closely with smaller contractors and improve their capabilities, technical manufacturing capabilities.

The balance of that program is a new program that is designed to diversify the defense laboratories to get them working on areas that are more compatible with our attempt to shift towards dual use.

Mr. McDade. For example?

Dr. Flamm. We are looking to the defense laboratories to identify projects. Dr. Anita Jones, the Director for Defense Research and Engineering, administers this program.

Mr. McDade. Is this the pass-through, this money from you to her, and she administers it?

Dr. Flamm. It is a technology program that is run by her; yes, she administers it. That is part of her budget.

Mr. McDade. Is this $106 million totally in your budget?

Dr. Flamm. We have a very small budget per se. Most of the technology budget is a research and development budget.

Mr. McDade. How about this $106 million?

Dr. Flamm. The Mentor Protege Program is administered by the Small and Disadvantaged Business Utilization office. The Laboratory Diversification Program is part of the technology budget administered by Dr. Anita Jones, who oversees the defense labs.

Mr. McDade. Thank you.

Mr. Murtha. Mr. Dicks.

DUAL-USE RESEARCH AND DEVELOPMENT

Mr. Dicks. I want to applaud your efforts. I have been skeptical a little bit about conversion. I have always supported the idea of dual-use technology, that is the right way to go. If we are going to spend money, we ought to spend it on programs with potential we are interested in. If in fact there is so much interest here and you can develop these partnerships, couldn't we do more of our R&D budget on this kind of an approach?

We have a bidding proposal, the contractors get a certain amount of money that they can utilize for independent research. In other words, if this is so good, why can't we then cut back a little bit in the R&D accounts?

We are looking for ways to take care of some other problems like the Army, cut back on some of these services' R&D accounts, because we are doing cutting-edge R&D with this program. Wouldn't this help?

Dr. FLAMM. It is important to understand that an essential element of our strategy for dealing with a reduced defense budget is to maintain key capabilities. One of those key capabilities is a qualitative technological edge, the technological superiority which is so basic to our force posture.

Mr. DICKS. You talked about protecting the industrial base as one way of doing that; is that correct?

Dr. FLAMM. When we say "protecting the industrial base" we mean that we are going to maintain defense-unique capabilities. But if we are going to rely on commercial industry to supply us with key systems, technologies and products, we have to make darn sure that that commercial industry is capable of providing the best products required in defense. That means maintaining R&D, keeping our technological edge, and keeping vital, required technological capabilities.

Mr. DICKS. Even at the expense of modernization of buying new systems? We aren't getting to the point here where if we continue to maintain this R&D budget, we are not going to be able to buy enough airplanes, tanks, stealthy aircraft, other important priorities of the country.

We are going to be cutting back on actual procurement of weapon systems. I worry a bit here that we are so interested in protecting our—readiness and in R&D, but we don't get any new equipment out the end of the door. Modernization is essential.

You have to have a balanced program. It looks to me as if the administration is more interested in readiness and more interested in R&D and less interested in producing weapon systems that will in fact protect our industrial base and give us the modernization that we need at the end of the day.

Dr. FLAMM. My reply to that would be that the Department's procurement needs were considered carefully in the Bottom-Up Review. It is something we have examined very carefully. We are not stinting on acquisition of required systems.

On the other hand, we have to face the reality that the world and threat have changed, and therefore the kinds of systems, the numbers of systems we acquire, the needs have changed. We have examined that. That is not my area, but we have gone through an effort to figure out what systems we need to buy.

One thing we have decided that is absolutely essential, where we can't cut spending, is the technological edge that will be required.

Mr. DICKS. It has to be put in a weapons system at some point. I hope that with Mr. Aspin's departure from the Defense Department, we will move away from the idea that we are going to do technical stuff, put it on the shelf, and then come back to it and go into procurement and 15 years later we have a weapon system; that never sound very practical.

ACQUISITION REFORM

Dr. FLAMM. We are trying to eliminate the 15-year lag between the development of technology and the weapon system. That is part of our strategy.

Two things are required for the kinds of fundamental change we are talking about here. Number one is a vision of where we are going, and I think the current DOD leadership have that vision.

I think the other thing you need, students of organizations tell us, is a crisis. The reductions in Defense spending that are inevitable may constitute such a crisis. We have to look to new ways to acquire the capabilities we require for our defense, and that means we must be serious about acquisition reform. We are serious about speeding up the procurement cycle, and we are serious about turning to commercial products, standards, and technologies and we are going to do it.

Mr. DICKS. And you are going to get the legislation through Congress that will allow you to use off-the-shelf weapons and commercial procurement practices; is that an integral part of this strategy?

Dr. FLAMM. There are various parts of the acquisition reform strategy. Part of it is legislative relief part on relief from regulations. Part is internal to the Pentagon. It means changing the way we do business, changing our mind-set and changing our regulations.

It means putting incentives in place to give program managers the assurance that they can use commercial standard and technology and not jeopardize the performance of their systems or their jobs. There are a lot of components of the acquisition reform process, sir, and we are working on all of them. It is important and we are going to do it.

Mr. DICKS. One thing I like about this program is that it is done on a merit basis. You are making these decisions based on an interagency approval basis, peer review.

Dr. DENMAN. Peer review, well-defined criteria and completely merit-based selection.

Dr. FLAMM. Competition is the byword here.

Mr. DICKS. And these teams are matching funding with their money. That is the part of this I like.

If we can get these companies to invest with us on these critical technologies and they are willing to put up their own money, that to me is like the market impulse.

We are saying we will partner with you, so if a guy thinks this effort will lead to production for him, there is more of an incentive to match funds. SEMATECH, I think, has been a great example of that.

Dr. DENMAN. Yes, sir.

Mr. DICKS. That is the example of how you do this right.

DUAL-USE TECHNOLOGY STRATEGY

Dr. DENMAN. I agree. Cooperation and cost sharing are the two key elements of the overall strategy.

Let me add one thing. Our total dual-use program goes far beyond the Technology Reinvestment Project. Just for ARPA—and I won't speak to the service programs, they have similar things—we have $1.2 billion of our budget for dual use in addition to the $2.7 billion Technology Reinvestment Project. So in a total budget of $2.6 or a total of $1.8 billion of our request is truly dual-use technology.

We view the TRP as a key outlet point for the dual-use things since it is designed to be close to the product. It is not a research program, it is very close to product development and manufacturing—trying to incentivize and move forward to actual products. So a total of $1.8 billion of our budget is legitimate dual-use activities where we are trying to push hard with this strategy to look at the industrial base as an integrated base as opposed to two separate bases.

Mr. DICKS. $1.8 billion, seems to me that is all R&D; right?

Dr. DENMAN. That is all ARPA budget, just the ARPA budget.

Mr. DICKS. I go back to my initial premise, if we are doing this extra stuff here on these crucial technologies—these are the centerpiece computing and manufacturing technology and electronics and materials initiatives—it seems to me that ought to allow us to make hard decisions—make some adjustments in R&D programs.

I know you are not going to agree to this. Is that inconsistent thinking? This is a whole new program.

Dr. FLAMM. We thought very carefully about how we are going to meet defense capabilities in an era of changed threats and reduced budgets, and an essential part of that picture is maintaining technological capabilities which are critical to our ability to field the most advanced systems. We are not going to be able to maintain those required technological capabilities if we cut deeply into our R&D budget. That is the bottom line.

Mr. DICKS. Where is the threat, who presents us with a threat that requires us to go beyond where we are today?

Dr. FLAMM. The Department has to worry about threats on the horizon, but we also have to worry about potential threats that may materialize in the future. The strategy for meeting potential threats is future investing in the technological capabilities that can be mobilized to give us defense capabilities we will need. In essence, this means having the technology that we can push out into the field when it is needed.

Mr. DICKS. My argument is you got to have a little balance here. The balance is too much on R&D and too little on procurement.

Dr. DENMAN. That is a judgment that has to be made. The Department made that judgment as part of the Bottom-Up Review. I think it was done thoroughly and with a lot of thoughtfulness. You not only want to protect the industrial base and the acquisition and the troops, but you also have to protect the future, and that is what this is about.

Let me make sure it is clear that we have made some significant shifts. The $625 million in the Technology Reinvestment Project came from the science and technology program overall. So the science and technology program is flat, it is not shrinking; that is the essence of the strategy——

Mr. DICKS. You are saying you did take this money out of R&D?

Dr. DENMAN. Absolutely.

Mr. DICKS. Thank you, Mr. Chairman.

Mr. MURTHA. Mr. Young.

Mr. YOUNG. Thank you, Mr. Chairman.

Doctors, why are you here today?

Dr. FLAMM. My response would be because I was requested to appear and give you a brief explanation of where we are going in terms of our——

Mr. YOUNG. Who requested that you be here?

Dr. FLAMM. My understanding was that the Committee requested us to be here.

Mr. YOUNG. What if you weren't here? What would happen? Why can't you go about your business and do what you want to do without coming over here?

Dr. FLAMM. This is a philosophical area——

Mr. MURTHA. I think one thing Mr. Young is getting at, is that you sound like you are making all the funding decisions. The taxpayer is the one through this Committee that makes those decisions. I get the impression that you make the decisions at the Department and think that the Committee has no ability to change those decisions, and that is discouraging to me.

I think that is the point of Mr. Young's question. We want you to know we asked you to come over to explain your budget request so that the Congress can decide on the policy and the amount of money that will be appropriated. You make the recommendation, we dispose of that recommendation over here.

Dr. FLAMM. Absolutely, sir. I agree wholeheartedly with that. The only thing I can attempt to explain is the thinking behind some of our recommendations.

Mr. YOUNG. I have no problem with that.

What the Chairman said was better than I would say and your answer is acknowledgment that Congress is a player in these decisions. The reason I asked the question is that I am carrying around a newspaper article quoting at length, people who work in your Department. The headline is:—$10 Million Largo Project Threatened.—That headline is not all that bad but the one I didn't like was the subheadline that says:—The Defense Department Complains that Representative Bill Young Didn't Play by the Rules to Get Money to Convert the DOE Plant to Commercial Use.—I didn't like that headline because I have always played by the rules. You just acknowledged that Congress is a part of what we do here. So what Congress decides, whether the DOD likes it or not, we constitutionally are part of the process.

Dr. FLAMM. You will get no argument from me.

Dr. DENMAN. I couldn't agree with you more. We are here to advocate what we think should be done, but it is your decision in the end.

NUCLEAR DISMANTLEMENT AND DEFENSE CONVERSION

Mr. YOUNG. Let me explain something. The first week of March we had witnesses testify here who told us that the DOD, is going to spend—we hadn't agreed to this in the Congress—we were told DOD intended to spend up to a quarter of a billion dollars on defense conversion in Russia and other former Soviet countries. This money is going to come from the money that we appropriated, that we intended to be used to dismantle the nuclear weapons of the former Soviet Union. But somebody across the river decided we are going to spend up to a quarter of a billion dollars on defense conversion for the workers in the former Soviet Union.

Then we get hit with a headline like this, that you are not willing to go along with converting a plant in the United States for American workers. It doesn't seem right to me, because the people that worked in this plant, like the people that worked in the system all over the country, were part of the reason that we won, and they don't deserve to be kicked in the back.

The DOE thinks the project that we are working on in this country is a great project. They are, in effect, leading the effort to make this a model defense conversion project and they are putting up money that DOE has had appropriated to make this plan work.

They have already signed right to use agreements, so that private contractors could use the facility. And the facilities are of a high-tech nature because at this plant they made the neutron triggers.

We don't make them anyplace else, and this is a particular type of technology that can be used in our peaceful economy. Incidentally, Congress initiated the idea of defense conversion in the first place. It didn't come from ARPA or DOD, it came from Congress. We initiated that idea—I may have been the one that suggested that we consider this facility, but almost anything that Congress decides to do was initiated by one or two Members somewhere in the beginning.

So, yes, I did initiate it, but this committee agreed and the Senate committee agreed, and the House agreed, and the Senate agreed, and the Conference Committee agreed, and the President agreed, because he signed the bill. Then we get somebody from your Department making comments like we didn't play by the rules.

Well, I disagree with that. Neither one of you are mentioned in this article, but someone that works for you is. I just don't think that it is proper for some mid-level bureaucrat, who was never elected to anything, to be making policy statements like this, when Congress going by the rules has adopted a policy.

Now, I get to my question. President Clinton was in California and he took credit for California having received 30 percent of the $250 million that had been awarded up to that point for defense conversion.

Florida received $7 million. We are about as big in defense work and the defense stand-downs as California is. Our university system and our chancellor wrote a letter to the delegation when he heard that, saying that he thought Florida was being shortchanged by the process of DOD and implied that he thought these awards were rigged.

I don't agree that I think the awards were rigged, but for some reason the President took credit for California getting 30 percent.

All we want is for your Department to pay attention to what Congress said. You have a real opportunity here. Another Agency of this government headed by Secretary O'Leary thinks this is a great project. They think this could be a model for defense conversion all over the country.

I tend to agree and Congress agrees, but Lee Buchanan in your office thinks we didn't play by the rules.

Dr. DENMAN. I received that article this morning. Dr. Buchanan is traveling so I don't know whether he actually made those statements or not. This issue has created an enormous amount of energy between ARPA and various Members of the Congress, which has made my life interesting, to say the least, for the past year.

Let me make sure it is clear we never ignore the intent of the Congress expressed either as report language or as law. When it is in the law, it is in the law and there is no question about that. But the dichotomy we face is that both the Competition in Contracting Act and the specific legislation for defense conversion requires merit-based competition for all these programs.

We have particular interest in report language from the Congress. We certainly don't ignore that, and we make provisions for those areas to compete. But we cannot ignore the Competition in Contracting Act, nor can we ignore the specific law with respect to defense conversion when we implement programs. We must do a competitive merit-based selection process, and that, we believe, is what we have done, with no tampering with respect to California or anyplace else.

It has been merit-based. In fact, we have had the GAO reviewing the Technology Reinvestment Project from day one with three people, and they are still there.

Mr. MURTHA. Let me stop you there and say we appreciate the difficulties. We know everybody would like to have projects in their area. We have tried to focus on areas where we thought they would be successful, and some have been, and we are waiting to see the rest of them.

I was just out at Fort Ord, California. They were saying it could cost up to $800 million, not Federal money, but private and Federal resources in order to convert Fort Ord with its environmental problems, and so forth. It is always a concern of the Committee when some people make off-the-cuff statements. Maybe it was misinterpreted by the reporter. We believe that it is essential for the people that worked so hard in defense over the years to have an opportunity to get into something else. I come from an area where we converted from steel and coal, lost 19,000 jobs in five years, with 24 percent unemployment at one time. We had a tremendous problem, and we had very little government assistance. Government assistance was important. So we appreciate how you are trying to handle it and we appreciate considering what we think is important as you go through the process, because with our experience we think our input is important to the overall product that you folks finally come up with.

Dr. DENMAN. I can assure you as long as I am in ARPA, the desires of this Committee and others will not be ignored in any way, shape or form.

Mr. YOUNG. I was not going to make an issue out of this. This newspaper article appeared on 11 January, and from a political standpoint, if I was going to jump politically, I would have done it back in January, and I didn't intend to do that until your witnesses came here the first week in March and said we were going to spend up to a quarter of a billion dollars in the former Soviet Union to convert their nuclear defense workers to civilian jobs. And I am getting hassled over $10 million in the United States.

It seems like it is better to lose than it is to win, sometimes. The employees at this plant who worked long and hard to make this system work feel the same way. They wonder if it was worth winning from their particular standpoint.

Thank you.

Mr. MURTHA. The idea of converting the Soviet Union is certainly important. We in this committee have restricted these conversion activities to the dismantlment of nuclear weapons with the money that we have appropriated. We think that is important to our national security and we think that is the reason that we should be involved in this enterprise. We also know how important it is to have a stable Soviet Union.

But we are on the real edge of running into quality problems with our infrastructure, quality of life, and everything you can think of.

As a matter of fact, I met with some spouses at Fort Campbell a couple of days ago when I was at Chairman Bill Natcher's funeral. They were telling me they were having trouble accessing the medical facilities because there had been funding cutbacks. So we are starting to feel the reduction in defense spending. And as important as this is, we have to take care of the people deployed more than ever because of the fact we still have a high tempo of operation.

The President is committed to not cutting back more, and I appreciate that commitment, because it is so important to the defense establishment.

Mr. Visclosky.

DEFENSE PRODUCTION ACT PROGRAMS

Mr. VISCLOSKY. Thank you, Mr. Chairman.

I have the flavor of what transpired prior to my arrival on the scene, and associate myself with the remarks of the Chairman as well as some of the points that Mr. McDade made. I gave witnesses last year the lecture on the 38,000 jobs lost in my district and what was or was not done to help them.

There is the Defense Production Act appropriation in Title III which is authorized by the Banking Committee. Last year, we appropriated $200 million for a number of projects and the people on the ground apparently are ready to go on a number of the projects that were designated. DOD has held up the funds, it is April, and as I understand it, no monies have been released. When will the funds be released and what is the hold up?

Dr. FLAMM. We are currently completing a review of the Title III program and methods of dispersing Title III funds. I would anticipate that when we have completed that review, and particularly when we have a new Assistant Secretary for Economic Security in place, we will proceed with a program for dispersing those funds in a manner that meets our defense needs in an effective and capability enhancing fashion.

Mr. VISCLOSKY. This is April. We are now into the seventh month of the fiscal year. When will we know?

Dr. FLAMM. When we complete the review.

Mr. VISCLOSKY. Is that going to be May 1st, April 25?

Dr. FLAMM. I can't give you an exact date. It will be within the fiscal year.

Mr. VISCLOSKY. I didn't ask you that. We appropriated the expenditure of $200 million for a number of programs that were authorized by another Committee of this Congress for this fiscal year, not by the end of the fiscal year. I am asking you a direct question.

Dr. FLAMM. My answer is that we want to spend that money in a responsible and worthwhile fashion for the defense capabilities of this country and we will respond in as quick and effective a fashion as we can to ensure the objective is met. We will work within the parameters set out by the Congress.

Mr. VISCLOSKY. Do you think that will be in the third quarter of this fiscal year?

Dr. FLAMM. I can't tell you precisely when, sir.

Mr. VISCLOSKY. One other question.

EFFECTIVENESS OF DEFENSE CONVERSION

I have had a number of meetings with people in the defense contract industry, and these have been over cups of coffee, breakfasts, wanting to find out about their businesses and programs. In the course of those conversations, I have asked the contractors and people involved in defense: What about the conversion program, is it useful? No one has told me it is.

Why do you think they are so negative about the program. I have sat down with a lot of people since January 1.

Dr. FLAMM. Two comments: I am disappointed that you got that reaction. We have had a lot of positive response to many of our programs. Gary told you about the enormous enthusiasm and interest that the Technology Reinvestment Project has aroused. I suspect that you didn't talk to some of the people involved in that program.

The programs we are working on now are of relatively recent vintage. We have basically had these programs in place for something like a year. We spent a year getting the programs into place and beginning to disperse monies.

I think it is premature to declare our strategy a success or a victory. I think we have some successes but I think the overall strategy is something that has to be given some time to show effectiveness. And demanding results barely after we have begun to disperse money for some of the objectives we took some time to formulate isn't quite fair.

Mr. VISCLOSKY. What is not fair? Are people being led to believe that a program that is funded by the Congress of the United States is going to be of assistance to them and that it is going to take several years before results are seen by these people.

If I am out of a job for six to nine months, and I am looking for a job, I don't care what your program looks like 12 months from now, I have to make a decision whether I am going to leave Rhode Island because we are not building submarines at the rate we did. I have got to make a decision that I have got to leave a community in east Texas because we are not making ammunition the way that we used to. I have got to make a decision; do I stay in Sacramento and take risk of suffering through another earthquake some day maybe and I have lost my job; why stay here?

We have had hundreds of thousands of people in uniform, out of uniform here lose their job. The point is to attach some urgency to this program, because somebody is out a job. You are not out of a job, I am not out a job; somebody is.

I went through this in my community. It devastates communities and people in regions. One of the facilities I recently visited—in east Texas—there won't be anything left when the Army ammunition plant closes.

I am not saying you can solve that particular problem. I am saying there ought to be some urgency here, it is going to take awhile. If you are talking two years to get up, we won World War II in four years. We are trying to put some people back to work here.

Mr. MURTHA. I think the urgency that Mr. Visclosky is expressing is a concern. The reason we get so many recommendations is people in a congressional district see the pain and suffering of the people that live there. They are frustrated, and that is because not only don't they have a job, they can't find a job. This is what Mr. Young is expressing, and what all of us are so concerned about.

I have asked Mr. Visclosky and another Member to look at the industrial base. What he has heard is, I think we have to do a little more work so people can understand that we are really trying to take care of them.

I have heard the same kind of comments, that defense conversion is not working and we are wasting money, we should be spending money on real defense. I happen to believe that it is important to help those areas that have worked so long and so hard in defending this country and building the weapons systems for this country. But there is going to be a lot of impatience with this program unless we see some results. So I would urge you to move as quickly as you can in getting these programs onto the street and taking care of people so they can get back to work.

Mr. Darden.

Mr. DARDEN. Thank you, Mr. Chairman.

I don't have much to add to the hearing today. I appreciate your being here Dr. Flamm and Dr. Denman.

I would like to turn to the positive side of the defense conversion programs and ask you if you can identify several examples of either ongoing programs or projected programs that you believe will serve as exemplars and as models for what defense conversion can do?

Just select one or two that you view as real winners and what is being done.

Dr. FLAMM. Let me just mention a couple of things. Our reinvestment programs, as I mentioned in my opening statement, are logically broken down into three areas.

One is the technology portion; that is a long-term investment and a medium-term investment. That is about reallocating resources and redirecting the way we fund defense needs.

I appreciate some of the short-term concerns about the pain being felt by communities. That is something we take very seriously, but our technology programs have a longer-term set of programs.

I think these are good programs which will have a beneficial effect, but we are not going to see the results of that tomorrow. That is a longer-term understanding. There is no way around that.

These programs meet two needs: They meet some of the human needs that you have talked to us about and we are very conscious of, and we take your concerns in this area seriously. But they also meet Defense needs; that is, they are oriented at meeting requirements for Defense capabilities as well.

I think we can meet both sets of needs in the long term through these technology programs.

Mr. DARDEN. Are you talking about things like high-definition television, or could you tell us some of those technologies?

Dr. FLAMM. We do have a high-definition systems program, not HDTV. Gary can tell you a little bit about it.

Before I turn to Gary to give you some details, let me make another point, which is that the technology programs are but one class of programs. We have other classes of programs.

Another is personnel assistance; that is a shorter term set of issues. The programs address human needs and damage to communities. There may still be excess pain that is not met by those programs, but we are doing our best within our resources to meet those short-term needs and requirements.

The third area is community assistance, trying to maintain communities integrity and trying to alleviate the problems associated with downsizing and base closings. Those are relatively short-term programs that we are targeting the short-term urgency that was discussed earlier.

We are doing the best we can with the resources we have and we hear what you are saying. The technology program is an area I am more familiar with. My area of expertise is dual-use technology policy for those programs.

I am the Acting Assistant Secretary of Defense for Economic Security, so, I have some knowledge of the personnel and community assistance programs. But my particular expertise is on the technology side.

Perhaps Gary and I can tell you a bit about some of those technology programs.

Dr. DENMAN. Let me give you three examples ranging from the small to the large. I mentioned already the engine business which is all about getting into composite materials which this country invented for defense. Composites are now into all sorts of products, ranging from golf clubs to tennis rackets.

Unfortunately, foreign industries have captured a great deal of these commercial markets and we are in great danger of losing that capability. The engine industry made it clear that this is a very strategic position for them for the future, and we have a very solid worldwide position in jet engines today. And I think it is critical for the military that we keep it that way. I don't think anybody would argue that point. So we have Pratt and Whitney with a large group of suppliers coming together to work composites.

On the same side of composites, we have a small program in California trying to use composites to find alternative markets for composites so we can sustain the industry, assure defense access to composites, while repairing bridges. This is a very interesting program in high earthquake zones of this country.

Now we put steel around the bridges and it is an expensive, long process. We are developing a machine to wrap the columns with composite materials, defense-generated composite materials, creating new markets for composites so we sustain defense access to the industry. That is one large one.

Another area in electronics is flat panel displays where the industry came together, much like SEMATECH, and said we have a common interest. These are very different from SEMATECH in that these are emerging industries, not well-established as in microelectronics, they are coming together to fund our suppliers, where our problems are common, the same way SEMATECH did it. We allocated $20 million to this initiative.

A third example is a very small one. We are concerned about maintaining access to what is called "pyrotechnic" or squib-kind of devices used for space and ejection seats in aircraft. Without large aircraft production or spacecraft production, its market has dropped precipitously. It is a very art-oriented capability. There is not a lot of science behind making these devices and materials.

This little company that makes the stuff for DOD came up with the idea of "power jaws of life." This is a tool that firemen use to extract you from an automobile, which now requires a long umbilical cord to a high-pressure hydraulic system. This would put a little cartridge of this pyrotechnics into the device itself and create a new market for key critical technology for defense as well as have obviously broad social implications of lifesaving, and so forth. These are just a few examples of the dual-use projects.

As I said, the interest level is high—frankly, I was flabbergasted at the amount of interest that was generated around the country. This tells you there is a lot of talent in this country that is pent up ready to do this merging of defense and commercial industrial bases, and hopefully we are stimulating that more for the future.

Dr. FLAMM. One more important example, is high-performance computing. The DOD in general, and ARPA in particular, are the key technology agencies that have been developing high-performance communications and computer technologies that are going to be used in our national information infrastructure.

Here is an area where new industries are popping up like flowers before our very eyes today. This is an area that clearly is going to transform the nature of economic activity in this country and the world.

The United States is the leader. We are leaving Japan in the dust and, we are leaving the Europeans behind us because we have made heavy investments in developing very high-performance communications technologies. These are also extremely relevant to defense.

In fact, they are essential to Defense, to the battlefield of the future in which information is going to be the currency that wins or loses battles. So it is defense technology and clearly a critical area for the economy of the future in which we now have a significant lead as a result of investing in this sort of dual-use technology.

I point to our investment in computing and communications technology as an absolutely critical area and an excellent example of the synergy between Defense and commercial needs that can leave both extremely better off.

COMMERCIALIZATION OF TECHNOLOGY

Mr. DARDEN. As a follow-up to that, it seems like we do have the ability to make the scientific discoveries but yet there seems to be a tremendous lag on our part in getting those to the market, in particular technologies that people are using now, video conferencing, for example, which was available up to 30 years ago. And we all know the story of the semiconductor, how we invented it and the Japanese took it to market and made all the money out of the industry.

What I am suggesting to you, would not the ability to translate or move these technologies from the laboratory to the marketplace be important, and shouldn't that be a priority of any defense conversion program?

Dr. FLAMM. Can I suggest, sir, that the record today is much more positive than your reading of the recent history would indicate. We have reclaimed market leadership in semiconductors from Japanese firms in good measure as a result of some of the investment that ARPA has oversight over, in things like SEMATECH. U.S. firms now are selling more semiconductors in world markets than Japanese firms, in part because of investments we have made that have extraordinary military utility.

Video conferencing is an area where the United States is ahead. We developed this capability 20 or 30 years ago. More recent technology has greatly increased the market.

The transmission systems, the switching systems, the high-performance communications systems that are making video teleconferencing cost-effective and creating new markets are in large part based on technologies developed with ARPA or DOD help. This is an example where the U.S. dominates markets for some of the advanced communications products associated with high-performance networks; things like routers and new types of communication switches.

U.S. companies lead in terms of market share worldwide because of the technological advantages our programs have given them.

Making the transition from laboratory to market has been a problem historically. We are conscious of the problem. We will be coming to you with innovative new ideas on how to better make the transition from laboratory to market, particularly when we are relying on markets to supply us with new technologies.

Mr. DARDEN. This is a priority with you?

Dr. FLAMM. Absolutely.

Mr. DARDEN. This should be the direction of your future efforts?

Dr. FLAMM. We have been thinking about it, we are working on it. It is something we are very conscious of, and we are going to pay a lot of attention to it.

I think you will be hearing a lot more about that from us.

Mr. DARDEN. Thank you, Mr. Chairman.

Mr. MURTHA. Any other questions?

Mr. MCDADE. No questions. Thank you gentlemen.

Mr. MURTHA. Thank you very much, gentlemen. There will be additional questions for the record.

The committee will adjourn until 1:30 this afternoon.

[CLERKS NOTE.—Questions submitted for the record and the answers thereto follow:]

ECONOMIC SECURITY

Question. Secretary Flamm, please explain to the Committee your definition of "Economic Security."

Answer. I would define economic security as protection from threats that could undermine the strong and competitive industrial base required to meet defense needs. I would add that the Department of Defense has a strong interest in enhancing economic security because our national security rests on the twin pillars of military capability and economic strength.

Question. How is the economic security threat to the nation assessed and defined?

Answer. Threats to economic security are assessed and defined within the Department and through interagency processes coordinated by the National Economic Council.

Question. What relative order of importance do you assign to Defense Department programs designed to meet economic security threats when compared to more traditional DOD programs designed to meet warfighting requirements?

Answer. I would respectfully disagree with the assumption that programs designed to meet economic security threats somehow compete with programs to meet warfighting requirements. On the contrary, the Department, working with the Congress, developed reinvestment and conversion programs so that it could continue to meet warfighting requirements effectively in an era of declining defense budgets. For example, dual-use technology programs will help maintain our technological superiority on the battlefield with more capable, more affordable systems, and personnel assistance programs such as the Temporary Early Retirement Authority will enhance readiness by improving the Department's management of force reductions.

DEFENSE CONVERSION POLICY

Question. For the record providing the amount of funding for all department defense conversion programs through the current five year defense plan.

Answer. The information follows:

DEPARTMENT OF DEFENSE REINVESTMENT AND CONVERSION

[Budget authority in millions of dollars]

Program	Proposed				
	1995	1996	1997	1998	1999
Technology reinvestment project	625	650	675	700	725
Other dual-use technology	1,523	[1] 1,523	[1] 1,523	[1] 1,523	[1] 1,523
Personnel assistance and community support	1,254	[1] 1,254	[1] 1,254	[1] 1,254	[1] 1,254
Total	3,402	3,427	3,452	3,477	3,502

[1] This is the 1995 level. Specific estimates for 1996 through 1999 are not yet available.

Question. Recently an executive from a large aerospace company defined defense conversion as "the process of a company deciding whether or not it intends to remain in the defense business" and nothing more. Do you agree?

Answer. No. The essence of the Department's dual-use strategy is to encourage companies to develop and produce technologies, processes, products, and systems that will meet military requirements as well as those of the non-defense marketplace.

Question. Another approach to defense conversion is the implementation of policies that incentivize current defense companies to consolidate operations, acquire smaller companies and gain commercial skills that they were not required to have in the past (i.e., marketing, sales, distribution, low-cost manufacturing, etc.) Do you think a more effective approach to defense conversion may be policy initiatives such as increased tax credits for research and engineering, cost-sharing of consolidation expenses, etc. and then letting companies win or lose in the market? What are some of the present conversion programs and policies that address these concepts?

Answer. The Department's policy is to let market forces guide the consolidation of the defense industry to the greatest extent possible. In exceptional cases, DoD might consider some sort of special treatment. Such actions will be identified on a case-by-case basis and will be the exception, not the rule.

Question. Do you expect that the number of jobs created by defense conversion programs will equal the number of jobs being lost by the current downsizing of the defense industry?

Answer. In the short run, no. The reinvestment and conversion programs are not by themselves large enough to offset fully the loss of jobs caused by declining defense budgets. I would add two points to place this answer in context. First, the effects of our programs are larger than their funding levels alone might indicate. Our programs have leveraged additional resources, such as matching contributions to the Technology Reinvestment Project, new private investments in dual-use capabilities, and new state funding for diversification efforts. These additional resources will help smooth the transition to lower defense budgets. Second, the dual-use capabilities in which we are now investing, including the TRP and other dual-use programs, could lead to high quality, high-wage jobs in the future.

TECHNOLOGY REINVESTMENT PROJECT (TRP)

Question. Mr. Denman as noted in Secretary Flamm's statement the Department's largest single dual-use reinvestment and conversion program is the Technology Reinvestment Project or TRP which is managed by the Advanced Research Projects Agency (ARPA) which you head. The fiscal year 1995 budget request before the Committee for the TRP is $625 million, an increase of 74 percent over fiscal year 1993, the first year of the program.

Update the Committee as to the status of the fiscal year 1993 TRP program awards. In your response please include: The total value of all projects awarded to date; the average value of a successful TRP proposal; the total number of companies involved.

Answer. A total of 212 proposals were selected for about $605 million.

Technology Development: 69 awards @ $340 million ($4.4 million average)

Technology Development: 86 awards @ $210 million ($2.4 million average)

Manufacturing, Education and Training: 57 awards @ $55 million ($1.0 million average)

Total number of participating organizations: 1709

Question. Describe the characteristics of the typical successful TRP proposal.

Answer. There are no typical "statistical" characteristics of winning proposals that have any meaning. There was a wide variation of winning responses, depending on the particular proposal. TRP funded large proposals and small proposals from a diverse array of participants. There are, however, certain common characteristics which were found in all selected proposals:

Goal/customer oriented: Clear definition of what was to be done, not a proposal just to bring in resources.

Well balanced, well structured partnerships: Each participant had a definitive role and together the partnership covered all areas of the proposal.

High quality/credible cost share: In Technology Development, this meant cash or cash-like (salaries, IR&D) match. The ready availability of these resources was apparent in winning proposals.

Real industrial leadership: Especially true in Technology Development, where commitment to "productization" was critical. This was also true in Manufacturing, Education and Training where industrial support for the projects was very important.

Dual-Use. The best proposals demonstrated a clear commercial and defense relevance.

Question. Have Any TRP participants actually received funding to date? If not, why not?

Answer. 61 of the 212 proposals have signed awards for $176 million. Another 42 ($84 million) are within two weeks of signing. In addition several have been given permission to begin the project prior to the completion of negotiations.

Question. Describe to the Committee the execution plan for the fiscal year 1994/1995 program.

When will the next proposal solicitation occur?

What will be the technology focus for the next round of awards?

Answer. In FY 1994, there will be two competitions.

The first, a Focused Competition, was announced April 8, 1994. This competition will seek Technology Development proposals in seven technology focus areas ($150–$180 million) and Technology Deployment proposals for Manufacturing Extension Centers ($23 million). The formal solicitation is expected on May 20, 1994, with proposals due June 30, 1994. Copies of the announcement and Program Information Package for this competition have already been sent to Members.

The second competition will be a more general competition including Technology Development, Technology Deployment and Manufacturing, Education and Training. In addition, there will be an TRP SBIR competition run in conjunction with this TRP. It is anticipated that this competition will consume the remainder of the FY 1994 funding and significant portion of the FY 1995 funding.

An announcement is expected in the summer, with proposals due in the fall.

Question. When will the fiscal year 1994 reprogramming of $150 million for the TRP be presented to the Committee?

It is the Committee's understanding that all TRP proposals rated as highly competitive will eventually be funded.

Is this accurate?

What is the current backlog of unfunded highly competitive proposals?

Answer. The $150 million reprogramming request was submitted to the Committee on April 12, 1994.

All proposals which were rated "Highly Recommended" at the end of the evaluation process were selected for funding. This required the use of $140 million of FY 1994 funds.

There is no backlog of "Highly Recommended" proposals. In Technology Development there was another $650 million worth of proposals considered "Recommended." These were good proposals; however, they were not as high quality as those in the "Highly Recommended" category. Many of these proposals dealt with technologies already selected for funding in the higher category. Hence, the decision was made that additional FY 1994 funds (above the $140 used) would be better spent on different focus areas.

Question. What sort of "lessons learned" or other forms of feedback are being provided for unsuccessful TRP proposers?

Answer. This varies by activity area. Under Technology Development, proposers were provided with a qualitative rating on how their proposal fared against those which were "Highly Recommended." Also, two lessons learned workshops were held (Boston and Los Angeles) which also provided instruction on how to put together successful consortia.

For Technology Deployment, two lessons learned workshops were held (Atlanta and Oakland). In addition, there was a Deployment session at the Los Angeles/Boston meetings described above.

Manufacturing Education and Training proposers will be provided with a qualitative rating similar to the one provided for Technology Development. In addition, there was a Manufacturing Education and Training session at the Los Angeles/Boston meeting described above.

All presentation materials from all workshops will be available to the public.

Question. Will initially unsuccessful TRP participants have the opportunity to compete in subsequent award rounds?

Answer. Yes, provided they meet the requirement/focus of the new competition. FY 1993 TRP proposers will not automatically be included in this competition; they should submit a new proposal, modified according to feedback provided by TRP. However, participants in the FY 1993 competition are automatically mailed all announcements about TRP competitions.

Question. What mechanisms and standards of measurement are in place for future evaluation of TRP program effectiveness?

Are TRP selectees required to furnish data about project outcomes.

Answer. ARPA is very aware that it must develop and implement a set of metrics for TRP. It is only by doing so that the benefit of

TRP to National Security (2501 objectives) and the overall integrated technology and industrial base can be determined. ARPA is currently preparing a report on the establishment of metrics for TRP to be formally submitted. The following is a brief summary:

For Deployment and Manufacturing Education and Training, ARPA believes that National Institute for Standards and Technology (NIST) and the National Science Foundation (NSF) respectively already have established approaches for assessing the progress of these efforts. These approaches will be formalized and all agencies will work with those "lead agencies" to ensure these TRP efforts are on track.

For Technology Development, the assessment is much more complicated. The ultimate goal is a true integration of the commercial-military industrial base where DoD can leverage its technical requirements off of a dual-use market. Each TRP project was selected for its long-term contribution to this integrated industrial base. Ultimate success of these projects will be based on the degree to which these long-term goals are met. While this can be readily measured at the time when the products or processes are in the market, these goals are likely to be achieved several years after the end of TRP funding.

The challenge is to assess these projects during the TRP funding in a way that is useful in managing the efforts themselves. The only way this can be done is by establishing a set of critical milestones for each TRP effort which are indicative of progress toward the ultimate goals. This will provide an interim assessment of TRP success before the true value can be measured.

The key to this assessment is determining these critical milestones. This will be done early in the project, in collaboration with the winning teams. These milestones will be both technical (success of technology) and fiscal (expenditures). Many will come directly from the "payable" milestones established in the agreement. However, additional milestones which would be indicative of moving in the direction toward successful commercialization but which are not part of the specific TRP milestones (e.g., identification of capital for production) will also be used. Because these TRP efforts must be successful in the commercial market, these factors are just as important. In effect, TRP will measure the success/progress of TRP efforts in much the same way that a commercial business determines and validates its own strategic plans to commercialize a product.

Participants will be required to provide data throughout the evaluation process, most of which will come from their TRP agreements or their business plan for commercialization.

Question. What is TRP policy regarding the participation of foreign companies as part of proposing consortia?

How many foreign companies have been part of successful proposals to date?

Answer. Foreign participation is allowed providing the minimum eligibility requirements as defined in the TRP statutes are met. In fact, TRP had a total of nine participants from five countries on the winning proposals.

DEFENSE CONVERSION BUDGET REQUEST

Question. The fiscal year 1995 budget request for Defense Reinvestment and Economic Growth Initiatives totals $3.4 billion. This includes all funding for dual-use technology initiatives, the technology reinvestment program, personnel and community transition assistance programs as well as other reinvestment initiatives. Please explain to the Committee what the funds for "other/Navy Dual Use Program" will be used for and how this relates to defense conversion.

Answer. In the fiscal year 1995 Navy science and technology budget request, the Navy proposes to begin a new dual-use initiative which promises to deliver future products that meet the needs of future naval procurements and also benefit the civilian sector.

This $50 million program is different from the successful DoD Technology Reinvestment Project, managed by the Advanced Research Projects Agency (ARPA). The new Navy dual-use initiative is focused on developing partnerships with industry and academia to identify and further develop emerging technologies which will be needed for improving or developing new products for future commercial markets and military systems.

One component of the proposed Navy dual-use program is an effort to strengthen the national shipbuilding base, by developing breakthrough technologies which could improve U.S. shipbuilding competitiveness and lower the production costs of both ships and shipbuilding equipment.

This dual-use effort will be tied with ARPA's Maritime Technology program and will focus on technology development, affordability through commonality, manufacturing processes, and technology base support programs.

I would like to repeat, however, that these dual-use efforts are only part of the Navy's full spectrum, integrated science and technology program. Dual-use efforts are only possible because of the range and depth of the Navy's overall science and technology program. This integrated program will connect defense technologies with commercial technologies, while ensuring the Navy-unique requirements of our forces are not overshadowed.

Question. Would there be any benefit to consolidating all defense conversion funding under a single appropriation.

Answer. The Department strongly opposes consolidating all defense conversion funding under a single appropriation. Funding reinvestment and conversion efforts in existing budget accounts enhances the Department's ability to manage these programs. Consolidating funding into one account would impose new administrative burdens that could result in delayed implementation and reduced effectiveness.

[CLERK'S NOTE.—End of questions submitted for the record.]

THURSDAY, MARCH 17, 1994.

SPACE AND RELATED PROGRAMS, DEFENSE

WITNESSES

GEORGE R. SCHNEITER, DIRECTOR, STRATEGIC AND SPACE SYSTEMS, OFFICE OF THE UNDER SECRETARY OF DEFENSE FOR ACQUISITION AND TECHNOLOGY

LIEUTENANT GENERAL THOMAS S. MOORMAN, JR., VICE COMMANDER, AIR FORCE SPACE COMMAND

THOMAS P. QUINN, DEPUTY ASSISTANT SECRETARY OF DEFENSE, C3I ACQUISITION, OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE FOR COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE

GIL I. KLINGER, DIRECTOR, SPACE AND ADVANCED TECHNOLOGY, OFFICE OF THE UNDER SECRETARY OF DEFENSE FOR POLICY

BRIGADIER GENERAL SEBASTIAN COGLITORE, USAF, OFFICE OF THE ASSISTANT SECRETARY OF THE AIR FORCE FOR ACQUISITION

INTRODUCTION

Mr. MURTHA. The Committee will come to order. This morning we will hear testimony from Dr. George R. Schneiter, Director, Strategic and Space Systems, Office of the Under Secretary of Defense for Acquisition and Technology; Lieutenant General Thomas S. Moorman, Jr., Vice Commander, Air Force Space Command; Dr. Thomas P. Quinn, Deputy Assistant Secretary of Defense for Command, Control, Communications and Intelligence Acquisition; Mr. Gil I. Klinger, Director, Space and Advanced Technology, Office of the Under Secretary of Defense for Policy; and Brigadier General Sebastian Coglitore, Office of the Assistant Secretary of the Air Force for Acquisition.

I want to wish a happy St. Patrick's Day to my fellow Irishman here, Mr. McDade. Notice we have our green ties on. We are ready for St. Patrick's Day.

Before the hearing starts, I want to put in the record a letter to Dr. Perry disagreeing with his proposed rescission of $40 million on the SSTO launch vehicle. We feel that would be a mistake and so we disagree with the rescission.

We will put the letter in the record.

[The information follows:]

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Congreſs of the United States
House of Representatives
Committee on Appropriations
Washington, DC 20515-6015

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CLERK AND STAFF DIRECTOR
FREDERICK G MOHRMAN

TELEPHONE
(202) 225-2771

March 17, 1994

The Honorable William J. Perry
Secretary of Defense
Washington, D. C. 20301

Dear Mr. Secretary:

In fiscal year 1994, the Congress provided $40 million to the Advanced Research Projects Agency to begin a competitive program of research and development for a Single Stage to Orbit (SSTO) launch vehicle. The Department subsequently proposed that the funds be rescinded.

As a part of a review of financing sources for the recent earthquake supplemental appropriations bill, the Congress specifically considered and rejected rescinding the SSTO funding. Consequently, the Department should proceed to obligate the $40 million provided for the next phase of the SSTO program.

Sincerely,

John P. Murtha
Chairman
Defense Subcommittee

Mr. MURTHA. We want to welcome you to the hearing. Who is in charge of DOD space programs? Last year we were concerned that there was really no one in charge of a program as large as this. Several years ago, we had disturbing testimony from an Air Force Four-Star who didn't have the program together.

We had him before the Committee a couple of months later. It took him two months to get his arms around his part of the program. We think it was a better hearing last year, but we are still concerned that the only time there is any cooperation is when you actually appear before this Committee. There should be more coordination. We appreciate your appearing before the Committee and look forward to your testimony.

We will put your statements in the record. We would appreciate a short opening statement so that we can get to the questions. As I understand it, Dr. Schneiter is the lead witness. Is that accurate?

Dr. SCHNEITER. Yes, sir.

Mr. MURTHA. Mr. McDade?

Mr. MCDADE. Mr. Chairman, thank you.

I just want to say welcome to the witnesses and to say there are only two kinds of people in the world today: Those who are Irish, Dr. Quinn, and those who wish they were. Happy to have you here.

SUMMARY STATEMENT OF DR. SCHNEITER

Dr. SCHNEITER. I am in the latter category, Mr. McDade.

Mr. Chairman and members of the committee, I am George Schneiter, Director, Strategic and Space Systems, Office of the Under Secretary of Defense for Acquisition and Technology. I appreciate the opportunity to appear before the committee today to discuss the Department's space activities as presented in the Presidents fiscal year 1995 budget request.

I have with me today at the table representatives of the Office of the Under Secretary of Defense for Policy, Mr. Gil Klinger; the Office of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence, Dr. Tom Quinn; and the Air Force Space Command, Lieutenant General Tom Moorman.

Also accompanying us are representatives from the United States Space Command: Captain Lloyd James, United States Navy; and the Office of the Assistant Secretary of the Air Force for Acquisition, Brigadier General Sebastian Coglitore.

I want to discuss in broad terms the state of DOD efforts in the space area and leave the specifics of policy and programmatic aspects to my colleagues in response to your questions. General Moorman also has some opening remarks. However, as you indicated, all of my associates at the table have statements that will be submitted for the record.

Mr. MURTHA. Without objection.

Dr. SCHNEITER. We have structured the Department's space programs along the following guidelines. The first priority is to sustain the operational space systems that provide support critical to the users. Next, we will continue ongoing deployments of new systems, ensuring they fit into the overall defense strategy, as well as meeting operational capabilities. Finally, we will pursue investments in research and development to satisfy new requirements where that investment will have significant payoff, where the programs are essential to counter new threats, and to leverage declining force levels.

In fiscal year 1995, we plan to launch one Delta II booster this year to support the Global Positioning System (GPS); one Atlas II to support the Defense Satellite Communications Systems (DSCS) constellation; an Atlas E for the Defense Meteorological Satellite Program (DMSP), and four Titan IV launches, including the second Milstar satellite. We plan to confine the improvements to our space launch infrastructure, with the Range Standardization and Automation project being the largest.

We are also in the process of further slowing the production of the Titan IV program to align with the reductions in requirements in the post-1999 time frame. This will result in a two-year delay in award of the follow-on program.

By the way, as we have done in the past, we have brought a copy of the DOD space budget for fiscal year 1995–1999, and we will leave it with your staff.

In response to Congressional direction in the fiscal year 1994 Authorization Bill, the Department initiated the Space Launch Modernization Study, under the direction of the Under Secretary of Defense for Acquisition and Technology, with Lieutenant General Tom Moorman as the Study Director. General Moorman will provide more information on this effort.

In response to efforts within the Department to address cost reduction, there were several actions taken. These included the following:

Cancellation of the Follow-On Early Warning System (FEWS), with plans for a new, less costly system, launched on a medium launch vehicle, called Alert, Locate, and Report Missiles (ALARM);

Cancellation of the Spacelifter program;.

Initiation of a tri-agency study to converge the separate operational polar meteorological satellite programs into a single program; and

Identification of lower cost alternatives to the baseline Milstar program.

Some noteworthy successes in the Department:

We returned the Titan IV program to flight status with the first Milstar launch in February;

We issued new policy guidance on the use of commercial Satellite Communications (SATCOM) capabilities to augment military capabilities;

We expect full operational capability for the Global Positioning System (GPS) later this year or early next year, and there is now agreement on use of GPS as the primary radio navigation system for civil/commercial use.

I would now like to discuss the Department's efforts in response to the Conference Report language of the Appropriations Committees on space organization and management.

The Principal Deputy Under Secretary of Defense for Acquisition and Technology recently provided a response to the Chairmen of the Authorization and Appropriation Committees. The Department will provide a report in August 1994, in response to the Congressional request. Some parts of that report must await the Roles and Missions Commission findings.

As you know, last year when I appeared before this Committee, we discussed much the same subject; namely, how we ensure that there is no duplication and full cooperation in the DOD space activities. The philosophy we have followed in the Department is to ensure that all interested parties have an appropriate say, with a process that ensures that we do our job in an efficient and timely manner.

We have determined that the separation of the policy and operational responsibilities from the acquisition responsibility serves the system best. From a policy perspective, the responsibility within the department falls upon the Assistant Secretary of Defense for Nuclear Security and Counterproliferation Policy, Ashton Carter. From an operational perspective, the Commander, U.S. Space Command, General Horner, has the responsibility for ensuring that DOD space systems meet the needs of the war fighter. From an acquisition perspective, the Under Secretary of Defense for Acquisition and Technology, my boss, has the responsibility for ensuring that space systems are acquired that meet the operational requirements as well as the policy objectives of the Department. He also provides the day-to-day oversight of these programs to ensure that they are acquired satisfactorily and that once they are acquired, they continue to meet the needs of the warfighter.

Mr. Chairman, that concludes my oral remarks. We appreciate the opportunity to appear before the committee and I shall be happy, together with my colleagues, to answer your questions.

[The biography and statement of Dr. Schneiter follows:]

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BIOGRAPHY

DR. GEORGE R. SCHNEITER

EXPERIENCE:

July 88-Present	Office of the Secretary of Defense. Director, Strategic and Space Systems, Office of the Under Secretary of Defense (Acquisition). Responsible for acquisition oversight of all DoD strategic systems (ICBMs, SLBMs, bombers, tankers, airlift, air-to-surface missiles, cruise missiles): strategic ballistic missile defense and air defense systems; and space-launch systems. Chairman, Strategic Systems Committee, Defense Acquisition Board.
1986-1988	Office of the Secretary of Defense. Director, Strategic Aeronautical and Theater Nuclear Systems, Office of the Director of Defense Research and Engineering. Responsible for oversight of DoD strategic bomber and air-to-surface missile programs, theater nuclear systems, and long-range cruise missiles.
1981-1986	Center for Naval Analyses. Team leader for study on Advanced Tactical Aircraft; participant in Outer Air Battle Study; project leader for study on naval applications of space technology.
1973-1981	Office of the Secretary of Defense. Deputy Director, DoD SALT Task Force; Senior Advisor to the Secretary of Defense's Representative to the SALT Delegation; conducted analyses of effect of potential SALT positions on US military posture, and of verifiability of SALT limitations.
1965-1973	Aerospace Corporation. Directed system concept definition and development program definition for Advanced Ballistic Reentry Systems program; analyst on studies of reentry vehicle trajectory perturbations and of solid rocket motor performance.
1960-1965	Purdue University. Research assistant; instructor in rocket propulsion.

DATE AND PLACE OF BIRTH: October 30, 1937; Louisville, Kentucky

EDUCATION: BSME, MSME, Ph.D. in Mechanical Engineering from Purdue University in 1959, 1962, 1966.

HONORS AND PROFESSIONAL AFFILIATIONS:

Meritorious Executive Presidential Award, 1980, 1989
DoD Distinguished Civilian Service Medal, 1981
DoD Meritorious Civilian Service Medal, 1989, 1991
American Institute of Aeronautics and Astronautics
Tau Beta Pi
Sigma Xi

STATEMENT BY

GEORGE R. SCHNEITER

DIRECTOR, STRATEGIC AND SPACE SYSTEMS
OFFICE OF THE UNDER SECRETARY OF DEFENSE
(ACQUISITION AND TECHNOLOGY)

BEFORE THE

SUBCOMMITTEE ON DEFENSE

COMMITTEE ON APPROPRIATIONS

HOUSE OF REPRESENTATIVES

SPACE PROGRAMS

MARCH 17, 1994

NOT FOR PUBLICATION
UNTIL RELEASED BY THE
COMMITTEE

Mr. Chairman and Members of the Committee:

I am George R. Schneiter, Director, Strategic and Space Systems, Office of the Under Secretary of Defense for Acquisition and Technology. I appreciate the opportunity to appear before the Committee today to discuss the Department's space activities as presented in the President's fiscal yearr 1995 budget. I have with me today representatives of the Office of the Under Secretary of Defense for Policy, Mr.Gil Klinger; the Office of the Assistant Secretary of Defense for Comminications, Commmand, Control, and Intellligence, Dr Tom Quinn; Air Force Space Command, LtGen Tom Moorman; and the Office of the Assistant Secretary of the Air Force for Acquisition, BGen Scbastian Coglitore.

I believe that I can best serve the process by discussing in broad terms the state of DoD efforts in the space area and leave the specifics of policy and programmatic aspects to my colleagues in response to your questions. Therefore, I will be the only one to provide specific remarks. However, my associates each have a statement that would be submitted for the record.

We have strucutured the Department's space programs along the following guidelines. The first priority is to sustain the operational space systems which provide suppport critical to the users. Next, we will continue ongoing deployments of new systems, ensuring they fit into the overall defense stratgey, as well as meeting operational capabilities. Finally, we will pursue investments in research and development to satisfy new requirements where that investment will have significant payoff, where the programs are essential to counter new threats, and to leverage declining force levels. I will focus today on those areas where I have specific responsibility, that of space launch and weather satellites, and on the areas that I believe this committee has a particular interest in, based on language in the FY 1994 committee report. These include space investment strategy and DoD space organization. Dr. Quinn's statement for the record will address the other satellite programs within in the Department. First, space launch. In the space launch area, we plan to launch two Delta II boosters this year to support GPS; one Atlas II to support the DSCS constellation; an Atlas E for the DMSP that I mentionned earlier; and five Titan IV launches, including the second Milstar satelllite. We plan to continue the improvemnets to our space launch infrastrucutre, with the Range Standardization and Automation project being the largest. In the booster area, the upgrades are focused on improved safety systems. We are also in the process of further slowing the production of the Titan IV program to align with the reductions in requirements in the post-1999 time frame. This will result in a two year delay in award of the follow-on program. To address the future need for Titan-IV beyond the current buy of 41 vehicles, we plan to convene a Defense Acquisition Board review in July of this year. Regarding the DC-X or Single-Stage-Rocket Technology program, the Ballistic Missile Defense Organization partially completed its planned flight test program prior to funds running out. The Department has identified funds to complete the test series if it is determined that the completion of the test program is consistent with the direction the Department chooses to take in the space launch area.

As you are aware, DoD completed its Bottom-Up Review of space launch last year. It was decided that, while a new launcher development effort would permit the Department to attain its desired goals for operational flexibility and reliability, as well as contribute toward improved competitiveness of the US commercial launch industry, those benefits did not outweigh the significant near-term costs of such an approach. As a result, the department opted for an approach to fund improvements to current systems and the associated infrastructure, but not to embark on development of a new launch vehicle.

In response to Congressional direction in the FY 1994 Authorization Bill, the Department initiated the Space Launch Modernization Study, under the direction of the USD(A&T), with LtGen Tom Moorman as the study director. I do not plan to discuss the specifics of this study, but will defer to General Moorman. I expect the Department to forward the results of this study to Congress in April. Additionally, the Administration, under the sponsorship of the Office of Science and Technology Policy, has initiated a national-level review of space launch, which they expect to complete this summer. The results of General Moorman's study will be a principal input to their effort.

With regard to the DoD weather satellite activities, there are two aspects. We expect to launch another Defense Meteorological Satellite Program, or DMSP, satellite this year. Also, we have been working together with the Department of Commerce and NASA for nearly a year to address the question of converging the three weather programs into one national program. Under the leadership of the DoD, a tri-agency report was completed and used by the OSTP in their crafting of an implementation plan. The OSTP draft implementation plan was provided to the tri-agencies for review and comment and will formally be provided for interagency review. The tri-agency study will be included in the final version of the implementation plan as volume 2. The Department believes that converging to a single U.S. system is not contrary to satisfying national security requirements. Next, I would like to provide the status of the Space Investment Strategy report in response tasking in the FY 1993 Authorization Act. This report is in the final stages of coordination within the Department and should be forwarded shortly. As we stated in our interim response, it was important that this report reflect the results of the Bottom-Up Reviews. This report is currently in its final stage of coordination within the Department. Although the level of space funding in the President' Budget will be declining, its' ratio to the overall Defense budget will remain constant or may increase slightly across the FYDP. Two areas where we are addressing additional cost savings include the work we have underway with NASA and Commerce to converge the weather satellite programs and the recent direction within the Department to require the use of commercially available components and require justification for parts built to Military Specification.

I would now like to discuss the Department's efforts in response to the Conference Report language of the Appropriations Committees on space organization and management. Because of the complexity of the organizational changes suggested and the relationship to other studies the Department has underway, we have been unable to met the schedule as requested in the report language. The USD(A&T) recently provided a response to the Chairmen of the Authorization and Appropriation Committees, stating that the department will provide a report in August 1994, in response to the Congressional request. We considered the option of carrying out this effort as part of the broader look on Roles and Missions directed by the Congress. It was our belief that the scope of the study requested in the Appropriations Conference report was beyond that of the Role and Missions Commission, but that the results could serve as a valuable input to the Roles and Missions Commission activity. With that in mind, the USD(A&T), in coordination with the USD(P), directed that we initiate an effort focused on responding to the specifics of the Conference report.

As you know, last year when I appeared before this Committee, we discussed much the same subject -- namely whose in charge and how we ensure that there is no duplication and full cooperation in the DoD space activities. Also the conference report language includes some items that were not part of last year's testimony, namely, the issue of a single appropriation and the identification of the Assistant Secretary of the Air Force for Space as the acquisition agent for DoD space.

The philosophy we have followed in the Department is to ensure that all interested parties have an appropriate say, with a process that ensures that we do our job in an efficient and timely manner. We have determined that the separation of the policy and operational responsibilities from the acquisition responsibility serves the system best. From an policy perspective, the responsibility within the department falls upon the Assistant Secretary of Defense for Nuclear Security and Counter-proliferation Policy, Ashton Carter. From an operational perspective, the Commander, US Space Command, General Horner, has the responsibility for ensuring that DoD space systems meet the needs of the warfighter. From an acquisition perspective, the Under Secretary of Defense for Acquisition and Technology, my boss, has the responsibility for ensuring that space systems are acquired that met the operational requirements as well as the policy objectives of the department. He also provides the day-to-day oversight of these programs to ensure that they are acquired satisfactorily and that once they are acquired, they continue to met the needs of the warfighter. In the acquisition process, the selection of the responsible agent for acquiring the capability has indeed involved different acquirers of space systems, as deemed appropriate. This does not necessarily mean that the process or implementation is inefficient and duplicative. There may be cases where some duplication is indeed warranted to reflect the critical nature of a specific capability.

As requested by the conference report, we will in the organization and management review reexamine this particular situation to see if there would be any benefit to having a single acquisition agent for all space systems. In doing this, we will obviously need to pay particular attention to the ability of a single acquirer to ensure that the needs of the other services are satisfactorily met.

With regard to the space responsibilities of each of the services and some defense agencies, I do not believe there is unwarranted duplication, gross inefficiencies, or fiscal irresponsibility. The process needs to ensure that each entity has the ability to address its unique needs for space support, consider how best to meet that need, and have the right to propose they be the lead. The current system within the department affords the opportunity to vent that process.

I appreciate the opportunity to appear before the Committee and shall be happy, together with my colleagues, to answer any questions you may have.

[The statement of General Moorman follows:]

DEPARTMENT OF THE AIR FORCE

PRESENTATION TO THE COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEE ON DEFENSE
UNITED STATES HOUSE OF REPRESENTATIVES

SUBJECT: SPACE PROGRAMS

STATEMENT OF: LIEUTENANT GENERAL THOMAS S. MOORMAN JR.
VICE COMMANDER, AIR FORCE SPACE COMMAND
PETERSON AIR FORCE BASE, COLORADO

MARCH 1994

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UNITED STATES HOUSE OF REPRESENTATIVES

BIOGRAPHY

AIR FORCE SPACE COMMAND

Directorate of Public Affairs 150 Vandenberg St. Suite 1105 Peterson AFB, CO 80914-4500 Phone (719) 554-3731

LIEUTENANT GENERAL THOMAS S. MOORMAN JR.

Lieutenant General Thomas S. Moorman Jr. is the vice commander of Air Force Space Command, at Peterson Air Force Base, Colo.

General Moorman was born Nov. 16, 1940, in Washington, D. C. and graduated from Suitland High School in Suitland, Md. He was commissioned through the Air Force Reserve Officer Training Corps as a distinguished military graduate in 1962.

For the first several years of his career, he served in a variety of intelligence and reconnaissance related positions within the United States and worldwide. While the general was stationed at Peterson Air Force Base in 1982, he became deeply involved in the planning and organizing for the establishment of Air Force Space Command. During his tour in 1987 at the Pentagon, the general also provided program management direction for development and procurement of Air Force surveillance, communications, navigation and weather satellites, space launch vehicles, anti-satellite weapons and ground-based and airborne strategic radars, communications and command centers. He additionally represented the Air Force in the Strategic Defense Initiative program and was authorized to accept SDI program execution responsibilities on behalf of the Air Force.

General Moorman is married to the former Barbara Ann Stadler of Salina, Kansas. They have two sons, Thomas S. III and John. The general considers Colorado Springs, Colo. his hometown.

EDUCATION:

1962	Bachelor's degree in history and political science, Dartmouth College, Hanover N.H.
1965	Squadron Officer School, Montgomery, Ala.
1972	Master's degree in business administration, Western New England College, Springfield, Mass.
1975	Air Command and Staff College, Montgomery, Ala.
1975	Master's degree in political science, Auburn University, Auburn, Ala.
1979	Air War College, by seminar
1980	National War College, Fort Lesley J. McNair, Washington, D.C.

ASSIGNMENTS:

1. 1962 - August 1965, intelligence officer, B-47 bombardment wing, Schilling Air Force Base, Kan.
2. August 1965 - October 1966, mission planner, 9th Strategic Reconnaissance Wing, Beale Air Force Base, Calif.
3. October 1966 - November 1967, operations officer, 432nd Reconnaissance Technical Squadron, Udorn Royal Thai Air Force Base, Thailand
4. November 1967 - November 1970, reconnaissance intelligence staff officer, 497th Reconnaissance Technical Group, Schierstein, West Germany
5. November 1970 - August 1975, assistant director of evaluation and later executive officer, Air Force Special Projects Production Facility, Westover Air Force Base, Mass.
6. August 1975 - August 1979, executive and later deputy director of plans and programs, Office of Space Systems, Office of the Secretary of the Air Force, Washington, D.C.

(Current as of Jan 1994)

7. August 1979 - June 1980, National War College
8. June 1980 - August 1981, deputy military assistant to the secretary of the Air Force, Washington, D. C.
9. August 1981 - March 1982, director of space operations, North American Aerospace Defense Command, Cheyenne Mountain Complex, Colo.
10. March 1982 - August 1982, deputy director, Space Defense, Office of the Deputy Chief of Staff for Plans, Peterson Air Force Base, Colo.
11. August 1982 - July 1984, first director, commanders group, Air Force Space Command, Peterson Air Force Base, Colo.
12. July 1984 - March 1985, vice commander, 1st Space Wing, Peterson Air Force Base, Colo.
13. March 1985 - October 1987, director of space systems, Office of the Secretary of the Air Force, Washington, D.C.
14. October 1987 - March 1990, director of Space and Strategic Defense Initiative programs, Office of the Assistant Secretary of the Air Force for Acquisitions, Pentagon, Washington, D. C.
15. October 1987 - March 1990, special assistant for Strategic Defense Initiative to the vice commander of Air Force Systems Command, Andrews Air Force Base, Md
16. March 1990 - March 1992, commander, Air Force Space Command, Peterson Air Force Base, Colo.
17. March 1992 - present, vice commander, Air Force Space Command, Peterson Air Force Base, Colo.

MISSILE/SPACE INFORMATION:

Badges: Master Space Badge

MAJOR AWARDS AND DECORATIONS:

Air Force Distinguished Service Medal
Defense Superior Service Medal
Legion of Merit with one oak leaf cluster
Meritorious Service Medal with one oak leaf cluster
Air Force Commendation Medal with one oak leaf cluster

OTHER ACHIEVEMENTS:

Recipient of the 1991 National Geographic Society's Thomas D. White United States Air Force Space Trophy, an award given to the individual who has made the most outstanding contribution to the nation's progress in space.
Earned the 1992 Gen. James V. Hartinger Award, presented by the Rocky Mountain Chapter of the National Security Industrial Association for outstanding achievements in the U. S. military space mission.

EFFECTIVE DATES OF PROMOTION:

Second Lieutenant	July 10, 1962	Colonel	July 1, 1981
First Lieutenant	June 9, 1965	Brigadier General	April 1, 1986
Captain	Jan. 2, 1967	Major General	Feb. 1, 1988
Major	May 1, 1973	Lieutenant General	April 1, 1990
Lieutenant Colonel	Nov. 1, 1978		

INTRODUCTION

Mr. Chairman, distinguished members of the committee, I appreciate the opportunity to address this committee this morning. Today I appear before you in two capacities. First, representing my boss, General Chuck Horner, I am here as the Vice Commander of the Air Force Space Command. In that capacity, I would like to share my views on some of the things we are doing and challenges we are facing in the Air Force space program today. I will highlight three areas: organizational changes, creation of a war fighting perspective, and the necessity for information dominance and space control.

My second capacity is that of the Chairman of the Space Launch Modernization Study which was directed in last year's Defense Authorization Act. As the study is still in progress and has not been fully coordinated, I will describe our process and share some preliminary observations.

ORGANIZATIONAL CHANGES

I would like to begin my remarks by acknowledging one of the most significant organizational changes that has occurred in Air Force Space Command in the last year, specifically the transfer of the Intercontinental Ballistic Missile mission. We have made a major effort to integrate seamlessly this important mission and the people into the Command. That integration is working very well and both the space and missile functions will be strengthened as a result of the merger.

Despite changes in the geopolitical situation, our Nation has a continuing need for the deterrent value of our ICBM forces, and we are pursuing efforts to keep this vital portion of our strategic triad effective through the year 2020. These life extension efforts to the Minuteman III ICBM weapon system include replacing the Launch Control Center command and control capability, replacing the propellant and motors for the missile itself, replacing the missile guidance system electronics, and downsizing the system from three reentry vehicles to one in compliance with current arms control agreements. We continue to support science and technology research and development efforts to provide a dormant or semi-dormant capability for our ICBMs consistent with our national desire to collectively relax our fingers from the nuclear trigger.

There are those who are now asking themselves if we really need to maintain or extend the life of the ICBM leg of the triad. This question undoubtedly will be addressed by the on-going Nuclear Posture Review. I believe we need to maintain the viability of the ICBM force. Our ICBM forces played a crucial role in winning the Cold War and permitted the President to restructure our nuclear forces during DESERT SHIELD -- releasing additional B-52s and tankers to support our operations in the Persian Gulf. ICBM forces shored up the reduced bomber posture, and with their virtual 100 percent alert rate ensured a robust, rapid response, hard-target kill capability preventing any of our potential adversaries from getting any ideas that they could take advantage of us as we built up and fought in the Gulf. Air Force Space Command intends to ensure the President will be able to rely upon that capability for the indefinite future.

Let me now turn to space to describe other important organizational changes. Before the Persian Gulf War, most warfighters did not completely understand nor have routine access to the comprehensive space capabilities developed by this Nation. Most of our space systems had been developed in response to, and served our strategic nuclear deterrence strategy against the Soviet Union. Because of the imperatives of the Cold War, classification and secrecy generally shrouded these capabilities. With the end of the Cold War and a result of our experience in a "hot war" in the Gulf, those barriers are coming down.

The Persian Gulf War, which my Chief of Staff, General McPeak dubbed "the first space war," and other regional crises, have vividly demonstrated the operational value of space to our theater forces. Our space-based capabilities -- communications, weather, navigation, surveillance, intelligence -- offer unparalleled opportunities. Too few airmen, sailors, and soldiers, had routinely trained with Global Positioning System receivers; or exercised with space-based intelligence support using CONSTANT SOURCE terminals and other intelligence dissemination systems; or had access to ground images from remote sensing systems such as SPOT and LANDSAT; or had access to threat warning data from the Defense Support Program of tactical ballistic missile launches. The contribution of these space assets in actual crises and combat has opened the eyes of our commanders and troops to the significant force enhancement capabilities available from our space assets. While the Gulf War created an awakening, that combat experience also underscored a number of shortcomings. Some of the more significant problems revealed were: no formal way existed to integrate space support for theater warfare, to organize space support to theater operators, or to train/exercise with space systems. As the air component commander during the war, Gen Horner was well aware of these shortcomings when he took over Air Force Space Command in the summer of 1992. Accordingly, within the Command, we have taken some important steps to remedy these deficiencies.

On 1 July 1993, the Air Force established 14th Air Force as its operational space component to US Space Command (USSPACECOM) as an organizational remedy to these problems. This action was very significant as numbered air forces are our war fighting components. Now for the first time, space capabilities within the Air Force are organized in a manner identical to the way other commands that support joint operations are organized. Regular and systematic air and space war planning, exercises and training are now possible. Fourteenth Air Force is now responsible for war planning, readiness, and execution; and it serves as the air component to USSPACECOM for satellite control, missile warning, communications, navigation, space surveillance and space launch operations support.

With 14th Air Force, the Air Force has gotten its war fighting organizational house in order. A second element in improving space support was to create a focus for developing and demonstrating concepts and capabilities to better apply space for all warfighters. That focus was created when the Air Force Space Warfare Center was established at Falcon AFB in Colorado Springs in December 1993. This Center is a battle laboratory to refine doctrine, develop tactics, formulate concepts and demonstrate systems and technologies that improve military operations and the employment of space in warfare. As part of a major outreach program, personnel assigned to the Space Warfare Center are now developing the operational plans to support the theater commanders. These personnel also participate in exercises and training, and explore innovative approaches for space support -- not only from the military space assets but also from the civil and commercial sectors. Individuals from the Space Warfare Center deploy as part of Air Force teams under the leadership of 14th Air Force to conduct integrated air and space operations under the Joint Force or Joint Task Force Commander. For example, over the past year, these Forward Space Support to Theater (FSST) teams have deployed to Korea, Saudi Arabia, Japan, Italy, and Germany in support of joint/combined operations and exercises.

Integral to the Space Warfare Center is the wargaming and analytical capabilities resident at the National Test Facility, collocated at Falcon AFB, CO. This collocation permits a linkage to other modeling and simulation capabilities throughout the country to provide space play into exercises worldwide.

The Space Warfare Center will be the Air Force's space, and historical, equivalent of the Air Corps Tactical School which existed at Maxwell AFB, Alabama in the 1920s and 30s -- and was responsible for developing many of the "air tactics and doctrines" employed during World War II. The Center will help develop prototype programs under the Tactical Exploitation of National Capabilities (TENCAP) Program, and it will refine doctrine, concepts and tactics for space applications to all warfighters. In short, it will be both the Air Force's center for concept development and proving ground for space applications similar to the Air Force's RED FLAG operations at Nellis AFB, Nevada. The Air Force has placed a high priority on the Space Warfare Center. To underscore that importance, a General Officer has been assigned to head up the 152 person center which includes 24 liaison people from the intelligence and acquisition communities. It should be noted the core manning of the Center is primarily from the air operations community -- the tactical, strategic, mobility, and special operations arms of the Air Force -- augmented by space operations personnel. .

Getting the organization and focus right is the first step, but it is not enough. Without training in all facets of space, our airmen will not be able to effectively exploit the advantages inherent in space assets. Training, therefore, is a key function of the Space Warfare Center. Through effective training and routine use, our people will gain confidence in their individual and unit skills, their equipment, and employment doctrines -- building confidence and competence in these areas results in more effective warfighters.

One recent success story of how our battle laboratory at the Space Warfare Center is working has been TALON SHIELD, a program developed after the Gulf War to exploit missile warning capabilities provided from the Defense Support Program (DSP). DSP performed well in detecting SCUD missiles and providing warning to coalition forces because conditions were optimum. Consequently, one of our lessons learned from the Gulf War was that we needed to improve that capability. So for the past couple of years, we have been looking at ways to obtain every bit of capability inherent in the DSP sensor.

With the TALON SHIELD program, which will become operational as ALERT in late 1994, the Air Force has developed a highly capable processing and dissemination system to deal more effectively with theater ballistic missile threats. TALON SHIELD uses commercial hardware and software and rapid prototyping techniques, to fuse data from multiple DSP satellites and combine that data with all source information. The program offers significantly improved theater missile defense capabilities over that available during DESERT STORM. This improved capability will help bridge the gap until we can field a more theater missile defense-capable satellite system -- called "Alert, Locate, and Report Missiles" or ALARM after the turn of the century.

Air Force Space Command is undergoing a major and rapid cultural shift. Our focus over the past several years has shifted from the "strategic" customer to one of tactical support; from an emphasis on operating space systems to getting the space-derived data and information to the warfighter; and from a research and development orientation which has been our heritage to an operational focus. These organizational changes -- 14th Air Force and the Space Warfare Center are important components of that cultural shift.

SPACEPOWER FOR TOMORROW

As our current Air Force Space Policy notes "spacepower tomorrow will be as decisive as airpower has been in the past." While I cannot predict when or whether we will achieve that policy tenet, it is clear space is becoming more decisive as we draw down our force structure and the U.S. military is reshaped in response to the major geo-political changes caused by the end of the cold war. The military advantages inherent in space systems are especially important as our forces become more of a Continental-based

Expeditionary Force. With the inevitability of less overseas presence, America will rely more on its space-based assets. These capabilities have become our "global eyes and ears" that enable us to use all our national instruments of power and to exercise American leadership in the post Cold War period. The role and value of information in modern warfare -- better understanding of the battlespace, development of concepts to more effectively integrate all information assets, and exploitation of our information advantage -- are being closely examined within the Air Force and within Air Force Space Command.

The so-called "Information Warfare" model which many people predict will change the scope, character, and tempo of modern warfare demands these changes. Information warfare means improving our ability to control the decision cycle which can dictate the timing and tempo of modern combat operations, increasing situational awareness for all warfighters, and enhancing the lethality of smaller force packages. This new concept of warfare exploits the flexibility, initiative, and professionalism of our forces and our technological advantages to achieve rapid victory with minimum casualties.

It is a commonly accepted view of the future that the world will become more dependent on information. The rapid growth in computer technologies and capabilities permit dramatic increases in productivity and may presage a global cultural and political shift. The Persian Gulf War with its stealth bombers; precision munitions; and information centers and capabilities, such as AWACS, JSTARS, and CONSTANT SOURCE provided a glimpse of how modern warfare might evolve. Space-derived information will be crucial to our ability to provide the Nation and our military forces global situational awareness, focused intelligence and information on evolving crises, and enable new techniques and tactics for our military forces.

By exploiting the advantages of space-derived information, military forces will be able to better understand threats, identify targets, and exploit theater-level opportunities which are present in the battlespace. For example, multi-spectral imagery offers an opportunity for all warfighters to better understand and react to the terrain. It can also help warfighters rehearse their missions, determine the optimum tactics, and identify major threat lanes or attack axes to more effectively exploit their training and technological advantages in combat. Satellite communications will be crucial to effective command and control of our forces -- especially since all services have adopted beyond line of sight operations as their preferred war fighting method. Lastly, precise navigation and attack methods require precise information about the position of targets. All services are developing tactics, techniques, and doctrines to leverage our information advantages -- including the direct downlink of information from space-based assets to the shooter -- to the cockpit, ship, tank, and foxhole. The goal is to make each military element more lethal, survivable, agile, and versatile so they can counteract evolving military threats. This approach is also affecting our developing "smart and brilliant" weapons which can apply information available to the shooter. In summary, the availability and accessibility of precise and timely information offers an opportunity to change the way we prepare for and fight future wars. Space support will be integral to our national ability to acquire, track, target and destroy military targets and must be fully integrated into all facets of our war fighting mentality and mindset.

The lessons of the Gulf War of the value of space and the importance of information warfare have not been lost on other countries. For example, by the end of this decade, over twenty nations are expected to have militarily significant space-based observation and communications capabilities. Additional nations will have access to the information derived from those platforms. The bottom line result of this proliferation of space capabilities is that there is a high probability that in future conflicts our forces will be surveilled from space. If our forces can be surveilled, then our soldiers, airmen, sailors and marines can be easily targeted. This future threat means that the U.S. must develop the means to deny an adversary access to space-derived information and products.

A full systems approach to space control must be developed -- one that looks at denying access to information from the satellite, through the user and ground links, to the processing and dissemination centers. Space control in the next century will likely be as vital as air and sea control have been in this century.

It is an exciting time to be in the space business in the Air Force. For two decades prior to the Gulf War, the Air Force space program was technology driven. Many believed fervently that space would ultimately prove critical in conflict -- DESERT STORM validated that belief. As you might recall, the Air Force senior leadership about two years ago redefined the mission of the Air Force. Our mission is "to defend the United States through the control and exploitation of air and space." This statement codified the equality of air and space within our service, and reflects the growing importance of this medium to our national security. Now we have more operational pull from the flying Air Force than we ever anticipated. Our challenge is to work with aviators to satisfy that demand. Learning how to use our magnificent space capabilities and integrating those applications, is the real growth industry in Air Force Space Command.

SPACELIFT UPDATE

I now want to shift gears and address what General Horner has described as his number one concern as Commander of Air Force Space Command -- launch. It is clear that before a nation can exploit space, it must have a capability to launch and control satellites. Our current launch systems are basically ICBM derivatives and employ 1960s-1970s technology. These systems are unresponsive and, for the most part, each launch is preceded by long and expensive delays. Moreover, as the requirements for on-orbit capabilities have come down, the cost of launch is rising. For example, a single TITAN IV launch, depending upon the configuration, today runs between $200-300 million and will likely become more expensive. While the Air Force's primary interest is to serve its military customers, there is a collateral economic effect. The US commercial space launch industry is becoming increasingly non-competitive in the international marketplace. Consequently, our US market share has steadily declined since our near monopoly 10-15 years ago.

In response to these trends, the Congress in last year's Defense Authorization Bill directed the Secretary of Defense to develop a plan that establishes priorities, goals, and milestones for space launch modernization for DOD, or if appropriate, the government as a whole. The language also directed that the plan identify new launch system requirements (if required) and examine innovative government and industry funding, management and acquisition strategies. The Act also stipulated that current space launch operations be reviewed for potential cost reduction. Finally, the Congressional direction stipulated that the plan should study the differences between U.S. and foreign space launch systems.

The Under Secretary of Defense for Acquisition and Technology (USD (A&T)) assigned the responsibility for preparing the plan to the Air Force, and the Chief of Staff selected me to chair a special Study Group. Although the direction was to the Secretary of Defense and the focus was national security needs, USD (A&T) directed that the Study be expanded to address NASA and commercial needs as well. The Study Group of around 40 top professionals, representing all space sectors, convened in the first week in January, and, today we are in our last two weeks of our effort. Although the coordination task will be extensive because there are so many stakeholders in the space launch business, USD (A&T) plans to sign out the report to the Congress some time in early April.

The Study's goal is to develop a plan to improve the nation's space mission accomplishment through an integrated, efficient and balanced space launch. The adjectives in this goal statement are important -- **integrated** means addressing the needs of all sectors; **efficient** means cost effective and operationally capable, and finally, **balanced** means developing a program that has an appropriate mix of funding for infrastructure/sustainment, technology, product improvement and new development. To help keep us focused on this goal, the study is overseen by a 13 person Steering Committee of senior officials and general officers representing the various space launch stakeholders in the Executive including NASA, the NRO, Departments of Commerce and Transportation, Office of the Secretary of Defense, JCS, ARPA, BMDO and the services. I should also note that we are in close contact with the Office of Science and Technology Policy, which is developing a series of policy recommendations on space launch for this Administration.

I want to assure you that this has been a comprehensive effort. During the first month, we heard from over 130 different groups and individuals representing the full range of parties interested in this issue -- space launch contractors, satellite providers, a Congressional staff group from both houses, space launch operations entrepreneurs and international consortia. Over the course of this data call, evolved a series of study objectives:

1) To establish a comprehensive space launch database

2) To understand and synthesize space launch requirements

3) To identify deficiencies in our current and planned capabilities

4) To determine and assess technical, operations, management and funding opportunities and innovative approaches

5) To develop space launch modernization options and associated roadmap

6) To create an integrated strategy with decision points

7) To make selected recommendations

The database I believe is the most extensive ever assembled on this subject. We are constructing it to be accessible and copies of the database will reside in several locations. Because there has been such a divergence among the space sectors in the way space launch requirements have been articulated, the study group spent a considerable amount of time in synthesizing requirements and subjected these needs to sensitivity analysis. I believe this requirements synthesis will be an important output of the study and may at long last permit the major space players to speak with one voice on their needs for space launch.

While the deficiencies in this area have been articulated for many years, the study group placed each of these shortfalls under a microscope to develop a common understanding and a set of criteria to judge alternative courses of action. Per the Congressional direction, innovative approaches to funding and managing space launch were critically examined -- from third party financing to creating a quasi-governmental body analogous to the COMSAT Corporation.

Our report to the USD (A&T) will include a number of options for consideration. These options range from the baseline -- the FY95 President's Budget which includes austere upgrades -- to evolutionary expendable launch vehicle improvements to a new start or "clean sheet of paper" expendable to a fully reusable vehicle. Each option with associated milestones will stand alone and include funding profiles, schedules and alternative implementation approaches. Each option will also be evaluated against certain criteria and then a strategic roadmap will be offered. Finally, the study will make certain non-option recommendations.

Mr Chairman and members of this Committee, this is a major effort which I believe will satisfy the Congressional intent. As this committee knows well, reaching and sustaining consensus among the various space sectors on space launch has been an elusive goal over the past decade or so. Accordingly, we have worked hard toward that end in this Study, and to this point we've been successful. As mentioned, I have yet to brief the senior leadership in Defense, NASA, and the NRO on the final study findings and recommendations. However, I will do my best to answer your questions given where we are in the approval/ coordination process.

Thank you for permitting me the opportunity to share these perspectives with you today. I look forward to your questions.

[The statement of Dr. Quinn follows:]

DEPARTMENT OF DEFENSE
OPENING STATEMENT
BY

DR. THOMAS P. QUINN

DEPUTY ASSISTANT SECRETARY OF DEFENSE
(C3I ACQUISITION)

BEFORE THE
SUBCOMMITTEE ON DEFENSE
HOUSE APPROPRIATIONS COMMITTEE
UNITED STATES HOUSE OF REPRESENTATIVES

March 17, 1994

OATSD (PA) DFOISR 94 -C- 030

"SPACE AND COMMAND, CONTROL AND COMMUNICATIONS (C3)"

I. INTRODUCTION

Mr. Chairman and members of the Committee, it is my privilege to appear before the committee to discuss the Department of Defense's (DoD's) Command, Control and Communications (C3) space programs.

In order to establish a perspective on the role and importance of space programs to our overall C3 capabilities, I will first provide you with an overview of the total FY 1995 budget request for C3 programs. I will then focus on the status of our space C3 programs and current issues surrounding them.

II. THE FY 1995 C3 BUDGET REQUEST

Command, Control, Communications and Intelligence (C3I) encompasses five major areas: Tactical Intelligence and Related Activities (TIARA), the National Foreign Intelligence Program (NFIP), information technology programs to include our Corporate Information Management (CIM) efforts, the Department's Counterintelligence and Security Countermeasures (CI&SCM) activities, and our C3 programs. The amount requested for C3 programs in FY 1995 is $14.9 billion and reflects a sound and cohesive overall program for sustaining our C3 capabilities. The $14.9 billion requested in FY 1995 for C3 programs may be further divided into the three major C3 mission areas: Defense-wide C3, Theater and Tactical C3, and Space and Nuclear C3.

Defense-wide C3 systems provide the long haul and common user communications, base level information infrastructure, and national level communications needed for a seamless, secure, reliable and cost-effective global telecommunications infrastructure. This global infrastructure supports the ready availability and transfer of information to meet world-wide military contingencies across the spectrum of potential military conflict. This same telecommunications infrastructure is critical to realizing substantial productivity gains. We are requesting $4.8 billion in FY 1995 for the broad range of telecommunication services provided by defense-wide C3 systems.

Theater and tactical C3 systems provide military commanders with the facilities and communications equipment necessary for managing conventional forces. The objective of theater and tactical C3 systems is to ensure secure, survivable, interoperable C3 systems for joint and combined operations. Given the emphasis on strengthening our ability to rapidly respond to regional crises, effective theater and tactical C3 capabilities are extremely critical, especially as the size of the force structure decreases. For our theater and tactical C3 programs, we are requesting $5.2 billion in FY 1995.

Space and nuclear C3 systems provide important capabilities in support of both strategic command and control (C2) and important elements of conventional C2. The nuclear C3 systems developed and maintained over the past forty years have been a key ingredient in sustaining the credibility of our nuclear deterrence. Consistent with a post-Cold War era, we are continuing to restructure, consolidate and downsize nuclear C3 assets to provide effective command and control of the nuclear forces, yet achieve significant cost savings and manpower reductions.

At the same time, we are moving forward with the satellite communication (SATCOM) systems needed to not only maintain command and control of our nuclear forces, but to also provide secure and interoperable communications for conventional warfare and rapid response to regional crises. Our forces must be capable of responding with speed and flexibility anywhere in the world where regional threats and conflicts emerge. Space C3 systems provide an unparalleled capability to support this rapid, global response requirement. As we pursue the force reductions and restructuring needed to respond to a new defense strategy, space systems will become even more important to C3 in the future.

The Ultra High Frequency (UHF) Follow-On satellite communications system, the Air Force Satellite Communications

(AFSATCOM) System, the Defense Satellite Communications System (DSCS), the Milstar system and the Advanced Extremely High Frequency (EHF) satellite will support our military needs into the next decade. Where appropriate, commercial satellites will also be used to provide cost-effective augmentation of these military capabilities, ensuring that both day-to-day and surge requirements will be met by the best combination of systems. A total of $4.9 billion is requested in FY 1995 for our space and nuclear C3 systems. Of this amount, $2.9 billion is requested for space C3 systems. This portion of the request which is devoted exclusively for space C3 reflects a commitment to not only maintaining our current space C3 capabilities, but also to building the space C3 capabilities needed into the 21st century.

I will now discuss the status of key space C3 programs and address related space C3 issues of current interest.

III. KEY SPACE C3 PROGRAMS AND ISSUES

Milstar Satellite Communications System

Milstar provides essential protected connectivity to meet military requirements. It satisfies core requirements of the DoD's SATCOM architecture and is integrally related to all other military communications satellites, as well as other terrestrial communications systems. The Milstar satellite system is planned to provide operational forces, especially highly mobile tactical units, with secure, survivable, flexible communications on a world-wide basis. The Milstar system operates in EHF, a previously unused part of the radio spectrum. This attribute plus other design features, like advanced signal processing, provide unique mission capabilities required by today's warfighters for power projection into possible theater conflicts around the globe.

While the Milstar program has focused on satisfying needs identified at its inception in the early 1980s -- providing secure, survivable, flexible communications for both tactical and strategic users -- the world situation has changed dramatically and so has the scope and application of the Milstar program. Although the threat of protracted nuclear war is greatly reduced, the threat of regional conflicts has risen dramatically. As you know, the Department restructured the Milstar program extensively three years ago, at congressional urging, to reduce costs and to account for changes in the international and national security environments. Requirements for a classified payload were deleted. "Heroic" survivability features envisioned for the Cold War environment were eliminated. The number of satellites, ground control elements and terminals were also reduced commensurate with the threat and force structure reductions. These along with other changes helped to reduce program life cycle costs by 25 percent.

Last year, the Department further scrutinized military SATCOM (MILSATCOM) programs as part of the Bottom-Up Review of military forces and major defense programs. The review evaluated numerous alternatives to Milstar while considering an updated threat estimate, operational requirements, cost-effectiveness tradeoffs, risk, and affordability. The review emphasized low data rate (LDR) and medium data rate (MDR) capabilities for U.S. tactical forces. It focused specifically on providing lower cost alternatives to the baseline Milstar program.

The alternative selected in the Bottom-Up Review calls for two Milstar I LDR satellites and four Milstar II LDR/MDR satellites, followed by the development and launch of an advanced EHF LDR/MDR satellite not later than FY 2006. It was selected because it best meets military requirements and provides the most capability at the earliest date. It also represents the best means of achieving needed capability while reducing long-term costs, and it is the strategy we are now implementing.

The first Milstar I satellite, with LDR only capability, was launched last February 7th. This launch marks the beginning of a new era in satellite communications. The second Milstar I satellite will be delivered in time to support a scheduled launch in FY 1995. Development of a MDR payload for expanded tactical utility is on track for a first Milstar II launch in FY 1999. Technology assessment for an advanced EHF system has begun, and an advanced EHF satellite is currently planned to be available for launch after Milstar satellite #6.

At the time of the Bottom-Up Review, the selected alternative was expected to save approximately $3 billion in program life cycle costs. After further examination, we now believe we can save almost $4 billion in life cycle costs, compared to the baseline Milstar program. These savings have been made possible through improved efficiencies in program execution and the transition to a lower cost, lower weight advanced EHF satellite design. Because we were able to use prior year FY 1993 funds appropriated for Milstar in conjunction with program efficiencies and the results of the Bottom-Up Review, the Department was also able to reduce the funding required in FY 1995 for Milstar satellites. This helped reduce our budget request from the $819.7 million projected last year for FY 1995 to the current $607.2 million request.

Wherever possible, the Department intends to continue identifying cost-effective reductions in line with current and potential future force structure decisions as a part of its overall SATCOM investment strategy. The Bottom-Up Review confirmed, with independent technical assessments, that a processed EHF satellite system provides great promise for meeting current requirements to provide protected connectivity to mobile forces. It validated the Milstar II approach as the lowest risk, near term solution, and it identified the need to transition to a lower cost, lower weight EHF alternative. Accordingly, we are currently examining a wide range of potentially applicable technologies to provide the foundation for the technology development necessary to support concept definition and development of a future, lower cost EHF satellite design.

Defense Satellite Communications System (DSCS)

DSCS is also an integral part of DoD's MILSATCOM architecture. The DSCS system includes a space segment of five fully capable and several partially capable satellites, a terminal segment of approximately 635 fixed, transportable, and mobile terminals, and a control segment of five fixed DSCS Operations Control Centers. Today's space segment is a mix of older DSCS II satellites and more capable DSCS III satellites. Six DSCS III satellites already procured are in storage and are awaiting launch when needed. To maintain the health of the constellation, we plan to launch one satellite in May 1995 and another in 1998. Based on current projections, replenishment satellites will be required after the year 2000 to continue DSCS or other follow-on service for the future. We are also examining possible modifications to the last four satellites to enhance their ability to support tactical users. These modifications and follow-on service alternatives will be addressed during FY 1995 and FY 1996.

Ultra High Frequency (UHF) Follow-on Satellite System

The UHF Follow-on satellite constellation will provide replacement satellites for the FLTSAT and LEASAT communications satellites. As the existing constellations reach the end of their expected operational lifetime, UHF satellites will be deployed to maintain worldwide DoD UHF communications capability. The requirement is for nine satellites in orbit, and a limited EHF anti-jam capability will be installed commencing with the fourth satellite. A contract was awarded in July 1988 for the first satellite. Although we did encounter a launch failure with the first satellite in March, we had a successful second launch last year, and we recovered sufficient resources from the contractor liability to provide a replacement satellite, with congressional approval, which incorporates an EHF payload capability. We look forward to the launch of the first system with an EHF capability in FY 1995.

Commercial Satellite Communications Initiative (CSCI)

On November 8, 1993, the Department promulgated new policy guidance for the use of commercial satellite communications. This policy was an outgrowth, in part, from the Commercial Satellite Communications Initiative (CSCI) studies directed by this Committee and the demonstrable benefits available from an increased use of commercial SATCOM for military applications.

The CSCI studies have demonstrated the applicability of commercial SATCOM to a variety of C3I missions. The new DoD policy guidance issued in November 1993 establishes the framework to integrate the Department's efforts for implementing commercial capabilities. It will guide the resulting commercial service investment strategy to ensure a cost-effective augmentation of military satellite capabilities by the Department.

The new policy states that to the extent operationally and fiscally practical, DoD will augment its military SATCOM capability with both domestic and international commercial services. To ensure that maximum savings are achieved through economies of scale, all acquisition of commercial SATCOM services shall be consistent with the approved Defense Information Services Network (DISN) acquisition strategy and shall be acquired through the auspices of the Defense Commercial Communications Office (DECCO) of the Defense Information Systems Agency (DISA), as a single manager.

As the use of commercial SATCOM increases throughout the Department, basic interoperability among Fixed Satellite Service (FSS) terminals will be established and maintained through the use of appropriate standards, and in a manner consistent with advancing commercial technology. To the maximum extent practical, all new military transportable FSS earth terminals shall be acquired with the ability to access both the commercial C and Ku frequency bands.

In support of this tasking, the Department recently hosted a Defense-wide Commercial SATCOM Conference which allowed for the exchange of ideas on the use of commercial satellite systems. DISA will capture this information into a program plan and for the first time, fully lay out a comprehensive Departmental commercial SATCOM strategy.

MILSATCOM Architecture

When the Department restructured the Milstar program in 1991, it also updated the MILSATCOM Architecture -- the framework used to manage, organize, and evaluate MILSATCOM systems relative to other satellite and terrestrial communications systems. The architecture provided a framework within which MILSATCOM cost reduction decisions have been evaluated and has resulted in a net reduction in life cycle costs of almost $20 billion dollars. That amount represents more than a 30 percent reduction in investment over the last three and one half years.

The 1991 architecture study identified numerous combinations of alternatives: existing systems with either enhanced or reduced capabilities, advanced technology proposals, and extensive use of commercial satellites. The DoD selected the baseline architecture of currently approved and ongoing systems, including Milstar, DSCS, and the UHF Follow-On.

However, the content of the baseline architecture used in the 1991 study has changed substantially over the past three years. While this 1991 architecture served the Department well, it is currently considerably out of date. With the series of program changes discussed above and the increased use of commercial systems to supplement military capabilities, we plan a comprehensive update of the architecture with a new DoD SATCOM Architecture for FY 1996. To support that update, the Department is currently conducting a review and recertification of requirements, identifying the mix of long haul and tactical transmission services which should be allocated to military and commercial systems, and identifying which communications networks could cost effectively transition from long haul Super High Frequency (SHF) service to commercial SATCOM or fiber optic cable. This extensive review of communications needs and systems solutions should be available for a full evaluation of the FY 1996 budget request next year.

Navstar Global Positioning System (GPS)

Navstar GPS is a space-based positioning and navigation system designed to provide world-wide, all weather, passive, three-dimensional position, velocity and timing data to a variety of U.S. and allied military users. GPS provides a military accuracy of 16 meters and a variable civilian accuracy set to 100 meters in peacetime. GPS proved of enormous military value in Desert Storm in all phases of combat operations where it was largely responsible for the swiftness and precision of our force movements and for the relative safety with which they were conducted. The fully operational constellation of 24 satellites is planned to be completed in 1994. Full Operational Capability (FOC) will follow completion of final systems testing and is expected in late 1994 or early 1995.

A joint task force of the DoD and Department of Transportation (DoT) convened early in 1993 to address several issues associated with growing civil use of GPS. It produced a report in December 1993 entitled "The Global Positioning System: Management and Operation of a Dual Use System." Issues studied by the task force were: GPS management structure, GPS funding, GPS Standard Positioning Service (SPS) accuracy, GPS integrity and availability, regulation of GPS augmentations, international acceptance, and spoofing and jamming of GPS. The report laid the foundation for future military and civil cooperation in the operation of this national resource. It builds upon long-standing relationships between the DoD and DoT in navigation systems planning and upon agreements reached earlier in 1993 for civil use of GPS. With these agreements and understandings, GPS will become the primary radio-navigation system operated by the federal government well into the next century. GPS will truly become a national utility and will fulfill its promise as a prototypical dual use system.

Space-Based Early Warning Systems

The Defense Support Program (DSP) is our primary system for providing the first warning of ballistic missile launches worldwide. It is a constellation of satellites in geosynchronous orbit that detect infrared radiation. The detected data is broadcast to ground stations where it is processed to determine if the data represents a missile launch. Once a launch is identified, tactical parameters, such as launch point, launch time, heading and missile class are calculated, and a warning message is sent to users.

DSP was developed in the late 1960s to address the threat to the U.S. from inter-continental and submarine-launched ballistic missiles. Since that time, the Department has made block changes to the satellite. These upgrades have provided improvements in sensor performance, satellite hardening, and longevity.

However, with the collapse of the Soviet Union and attendant changes in threat from strategic ballistic missiles, it became necessary to re-examine our early warning systems. These systems and our plans were examined in an internal DoD review conducted last summer. Because of the national security issues at stake in the early warning mission, the Department also convened an independent study group, in parallel with the Department's internal review. The study group examined several alternatives for satisfying the early warning mission. These alternatives included the existing DSP, a light-weight DSP, the then proposed Follow-on Early Warning System (FEWS) design, a light-weight FEWS design, and a new satellite design developed by the study group. The group recommended that the Department should:

- continue the block buy of three DSP satellites because of near-term considerations; and

- terminate the FEWS program because it was intertwined with nuclear war-fighting and the Strategic Defense Initiative and, therefore, was not responsive to current DOD needs.

In our internal review, we also examined the option of modifying the DSP platform to reduce weight and improve sensor performance. Neither the Department's internal review nor the independent study group found advantages to this concept that outweighed the advantages of a competitive effort for a new early warning system.

Accordingly, our bottom-line conclusions are the FEWS program as configured is unaffordable, but a new early warning system is still needed. As a result, we are in the process of canceling the FEWS program, and plan to start a program to replace DSP with a system that will have less on-board data processing than FEWS, but better detection performance than DSP especially against tactical ballistic missiles. The cost of this program will be less than continuing with DSP, and we'll be able to boost it into orbit on a medium launch vehicle (MLV) instead of a TITAN IV. The Air Force is reviewing the requirements for worldwide early warning and is constructing a new program that is affordable. Next year, we plan to start contractor efforts on a new design for the DSP follow-on program.

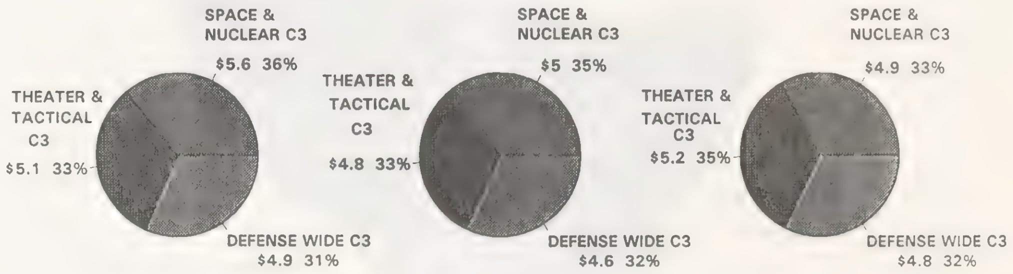
IV. CONCLUSION

In conclusion, I ask the Committee's support for our space and C3 programs. Within the framework of reduced defense spending, we constructed a space C3 program that will allow a high degree of responsiveness to regional contingencies and addresses the challenges that we will face in the 1990's and beyond. The Congress has consistently supported the role of C3 in our national defense by providing the resources necessary to develop and field critically needed capabilities, and we ask for your continued support for the space C3 programs contained in this year's budget request. These programs strengthen the Department's ability to deal with the increasing pace of change and the emerging requirements for more efficient and cost-effective force management capabilities associated with the new national security environment.

C3 RESOURCES
BY MISSION AREA

($ IN BILLIONS)

FY 1993 ($15.6) FY 1994 ($14.4) FY 1995 ($14.9)

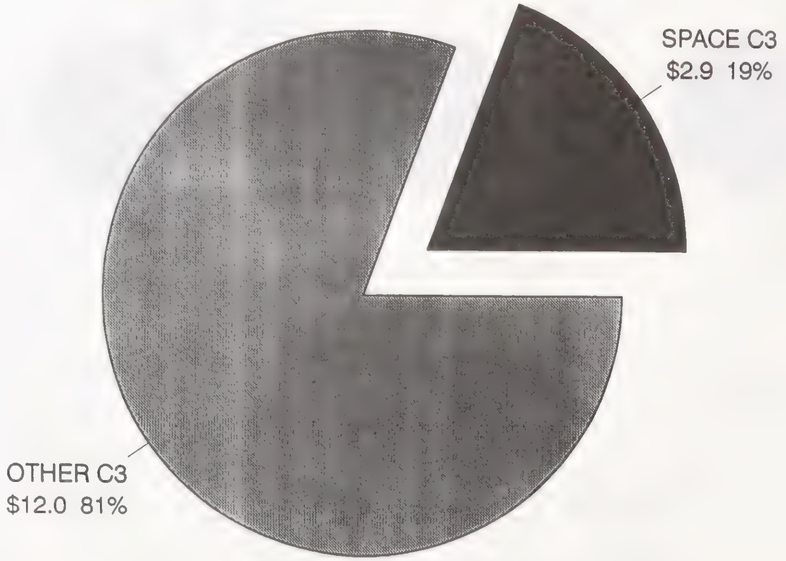


FY 95 PB

SPACE C3

(TOA $ = BILLIONS)

FY 1995
($14.9)

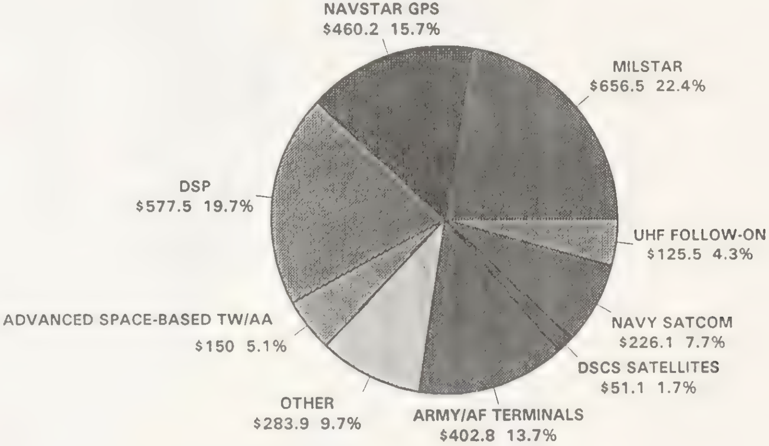


FY 95 PB

SPACE C3
BY MISSION AREA

($ IN MILLIONS)

FY 1995



FY95 PB

[The statement of Mr. Klinger follows:]

DEPARTMENT OF DEFENSE

OPENING STATEMENT

BY

MR. GIL I. KLINGER

DIRECTOR, SPACE AND ADVANCED TECHNOLOGY STRATEGY
OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
NUCLEAR SECURITY AND COUNTERPROLIFERATION

BEFORE THE
DEFENSE SUBCOMMITTEE
HOUSE APPROPRIATIONS COMMITTEE
UNITED STATES HOUSE OF REPRESENTATIVES

March 17, 1994

Not For Publication Until Released
By The Committee On Appropriations
House of Representatives

Mr. Gil I. Klinger (SES-3)

Experience:

Department of Defense, Office of the Assistant Secretary of Defense for Nuclear Security and Counterproliferation.

- **Director, Space and Advanced Technology Strategy**. October 1993 to Present.
- **Director, Strategic Forces Policy**. July 1992 to October 1993.
- **Deputy Director for Targeting, Strategic Forces Policy**; manager for special SecDef/Chairman, JCS directed top-to-bottom review of nuclear targeting; also responsible for other ongoing targeting projects and supervision of staff. Fall 1989 to July 1992.
- **Assistant for Strategic Forces Policy**; responsible for development and implementation oversight of nuclear targeting policy; familiar with U.S. weapons systems, employment planning process and its management, and with Soviet strategic systems and doctrine. Spring 1987 to Fall 1989.
- **Presidential Management Intern**; rotational staff assignments throughout OSD, with the U.S. Army, and at the National Security Council (NSC). Fall 1985 to Spring 1987.

The RAND Corporation

- **Consultant in Political Science Department**; projects included work on SALT II compliance, and conventional defense modernization. Summer 1984 to Fall 1985.

Department of Defense, Navy Strategic Systems Project Office

- **Analyst for Trident II(D-5) Missile Program**; evaluation of arms control treaty impacts on Navy ballistic missile forces; assisted in study of missile accuracy related aspects of D-5 development contract. Spring 1983 to Fall 1983.

Carnegie Endowment for International Peace

- **Senior Research Assistant**; assigned to The Arms Control Association. Responsibilities included specialized research and analysis; organization and supervision of student intern program. Winter 1981 to Summer 1982.

Office of Senator William Proxmire

- **Intern**; responsibilities included research and analysis of Defense and Foreign Relations legislation, and speech writing. Fall 1981.

Education:

John F. Kennedy School of Government, Harvard University

- **Masters in Public Policy, June 1984**. Field of concentration: International Security. Thesis titled Sea-Launched Cruise Missiles (SLCMs): Strategy and Prospects for Arms Control.

State University of New York at Albany

- **Bachelor of Arts, May 1981**. Double Major: Political Science/European History. Teaching Assistant in Political Science and History Departments, 1980-1981.

Honors/Awards: Secretary of Defense Medal for Meritorious Civilian Service, 1993; Department of Defense Distinguished Civilian Service Award, 1990; Office of the Secretary of Defense Outstanding Performance Citations, 1985-1990; Department of Defense Superior Accomplishment/Special Act Award, 1988, 1990; U.S. Army Certificate of Achievement-Commendation for Distinguished Service, 1987; and Phi Beta Kappa, Summa Cum Laude, Dean's List, 1978-1981.

DEPARTMENT OF DEFENSE SPACE POLICY

INTRODUCTION

Mr. Chairman, and members of the Subcommittee, it is my privilege to appear before the Subcommittee as the representative from the Office of the Under Secretary of Defense for Policy to discuss the Department of Defense's (DoD) policy regarding space and related activities.

The United States conducts activities in space necessary for national security. DoD space policy recognizes space as a medium, like the land, sea, and atmosphere, within which military operations can take place in support of U.S. national security objectives. Achieving our national security objectives in the most effective and efficient way requires that the capabilities of space forces be fully utilized for national defense. The Persian Gulf conflict of 1991 and other recent contingencies demonstrated that space forces are fundamental to modern military operations. Consequently, space forces will play important roles in helping to counter the new dangers which could threaten U.S. national security interests now and in the future and assist in the successful execution of national security strategy and national military strategy.

In particular, space systems provide force multipliers that are increasingly important for sustaining an effective level of U.S. defense capability as overall force structure is downsized and restructured. Space forces meet a wide range of requirements critical to the National Command Authorities (NCA), combatant commanders, and operational forces. The global coverage, high readiness, non-intrusive forward presence, rapid responsiveness, and inherent flexibility of space forces enable them to provide real-time and near-real-time support for the full range of military operations in peace, crisis, and across the entire spectrum of conflict.

SPACE FORCES AND THE REVOLUTION IN MODERN WARFARE

Advances in technology provide the potential to alter fundamentally the conduct of modern warfare. Driven primarily by improvements in information collection, processing, and transmission technology, this revolution could have an impact upon military operations at least as dramatic as the introduction of the aircraft or tank earlier in this century. Space forces are playing a central role in this ongoing revolution because they provide unique capabilities for gathering, processing, and disseminating information.

The Persian Gulf Conflict and Space Systems

The contributions of space forces to U.S. defense strategy and military operations were not widely recognized prior to the Persian Gulf conflict of 1991. In part, this was because DoD's exploitation of space systems during the Cold War focused heavily on providing support to the NCA and strategic nuclear users in peacetime. Space systems played significant roles, however, in the success of contingency operations in Grenada (Urgent Fury, 1983), Libya (El Dorado Canyon, 1986), the Persian Gulf (Earnest Will, 1988), and Panama (Just Cause, 1989). Since Operation Desert Shield/Desert Storm, space systems have played significant roles in support of nearly every U.S. military operation including those in Iraq (Provide Comfort), Somalia (Restore Hope), and the former Yugoslavia (Provide Promise).

The Gulf war was a watershed event with respect to the emergence of space power as a element of U.S. military power. Indeed, Operation Desert Storm has been called the first space war. U.S. national security space systems, augmented by U.S. civil, commercial, and allied space systems, were employed more extensively than in previous contingencies and with broader integration into the overall force structure. From the initial force deployment planning to the final cease-fire, space systems were integral to nearly all phases of military operations. Space forces directly influenced the course and outcome of the conflict. They helped to pierce the fog of war and moderate the friction of combat. Consequently, space forces helped to confer a decisive advantage upon U.S. and coalition forces in terms of combat timing, operational tempo, synchronization, maneuver, and the integrated application of firepower.

During the Persian Gulf conflict, the United States demonstrated that it is the only nation with a high technology "system of systems" which integrates command, control, communications, computers, and intelligence (C4I) systems with military platforms and weapons systems equipped with advanced conventional munitions. As employed in Operation Desert Storm, the U.S. C4I-to-strike force was overwhelmingly effective against an adversary with conventional armored forces and air defense systems. Space forces provide key capabilities to integrate and deliver C4I support to land, sea, and air forces. In particular, space systems provide:

- Global, real-time and near-real-time, all-weather, day/night, reconnaissance, surveillance, early warning, attack assessment, and environmental monitoring for a dynamic, multidimensional picture of the area of operations to observe the entire theater, assess enemy and friendly strengths and weaknesses, and define objectives.

- Instantaneous, secure battle management, command, control, and communications for rapid and coordinated execution and redirection of force packages and joint operations for maximal effect;

- A global three-dimensional grid reference system for standardizing the locations of force positions, force directions, and force objectives to facilitate the flexible, discriminate application of individual force packages and joint operations; and

- Continuous, real-time, all-weather, day/night, precise navigation, positioning, timing, and velocity data for the attainment of near-zero circular error probable weapons delivery accuracy, thereby minimizing the level of force required to achieve an objective with minimum casualties and collateral damage.

Space-based force multipliers help to improve operational effectiveness, efficiency, and interoperability; maintain high technology superiority; and support worldwide deployment, sustainment, and operations of U.S. land, sea, and air forces. By providing almost global coverage, space forces help to compensate for reductions in forward positioned infrastructure and provide ready, in-place capabilities to support U.S. forces worldwide without the need to mobilize additional combat resources.

C4I and the U.S. Contribution to Global Security

Space forces are a comparative advantage of the United States and are an area within coalition strategy that can contribute unique capabilities for global security. In particular, space systems are capable of performing missions which place a premium on interoperability and the capacity to operate effectively with other nations' forces. Space systems will enable United States and allied land, sea, and air forces to operate jointly in a more efficient and effective manner. They may also provide a means to support political commitments without putting U.S. forces at risk. Moreover, certain space systems provide dual-use capabilities employed by U.S. as well as international civil and commercial users in peacetime.

The exploitation and control of space will enable the United States to establish information dominance over an area of operations. Establishing such dominance will be the key to achieving success in future crises or conflict. As Gulf war showed, this can greatly enhance U.S. and allied ability to fight on favorable terms by taking the initiative away from the adversary. The ability to provide C4I support to U.S. forces, and deny such support to an adversary, will enable our combatant commanders and operational forces to think and react faster than an adversary and thereby dictate the timing and tempo of operations. Seizing and maintaining information dominance progressively, and in an accelerating manner, will help to paralyze an adversary's ability to command and control its forces.

The Persian Gulf conflict, however, also enabled our allies and potential adversaries to observe the value of, and U.S. reliance upon, space forces. As a result, numerous countries in regions around the world are acquiring or accessing space systems, technologies, and products. Foreign nations and subnational groups are obtaining space capabilities through indigenous efforts, purchases of goods and services, and cooperative activities. Combined with the proliferation of nuclear and other weapons of mass destruction, missile systems for their delivery, and advanced conventional weapon systems, the spread of indigenous military and intelligence space systems, civil space systems with military and intelligence utility, and commercial space services with military and intelligence applications poses a significant challenge to U.S. defense strategy and military operations.

Consequently, DoD must be able to ensure freedom of action in space for friendly forces while, when directed, limit or deny an adversary's ability to use the medium for hostile purposes. To ensure space control, DoD will preserve its capabilities to surveil and monitor all military significant activities in space. DoD also will continue to design, develop, and operate space systems with ensured survivability and endurability of their critical functions. Moreover, DoD must have capabilities to deny an adversary's use of space systems to support hostile military forces.

In addition to military countermeasures, DoD's strategy to deal with the threat posed by the proliferation of space capabilities with military and intelligence applications includes: actions to strengthen U.S. competitiveness in foreign markets; measures to protect technologies, methodologies, and overall system capabilities which sustain U.S. advantage in space capabilities and promote continued U.S. technological advancements; maintaining controls over significant capabilities which can be sold or transferred to foreign recipients; government-to-government relationships with friendly states involving the sharing of space technology, products, and data;

and agreements or arrangements which limit or deny foreign access to space systems, technology, products, and data which could provide support to hostile forces.

Space and Nuclear Deterrence

Space forces are an integral element of the overall deterrent posture of the U.S. armed forces. Any nation contemplating an action inimical to U.S. national security interests must be concerned about American space capabilities. Space systems provide the NCA, combatant commanders, and operational forces with unprecedented global situational awareness to identify and react to threats. Although the United States is withdrawing some forces from overseas bases, space systems continue to provide non-intrusive, near-global coverage. Space forces thus increase the risk that inimical actions will be discovered by the United States, can introduce an element of uncertainty into the minds of potential adversaries, and thereby may influence the risk calculations another nation will make before it initiates aggressive behavior.

More specifically, space forces provide unique capabilities for collecting and disseminating information for determining other nations' capabilities and intentions. This includes information for indications, warning, and responding to the threat or use of weapons of mass destruction against the United States, its armed forces, allies, and friends. Space systems also support treaty monitoring and enable Presidential and diplomatic communications to convey our national interests and objectives to allies and adversaries. Space systems thus are critical to the ability of the United States to sustain a credible deterrent posture which will continue to ensure that the costs of the threat or use of mass destruction weapons and delivery systems are unacceptable.

Space forces also are essential for ensuring that U.S. land, sea, and air forces are capable of conducting operations to delay, disrupt, deny, or destroy the acquisition, deployment, and supporting infrastructure of weapons of mass destruction and missile systems. Space systems collect and disseminate information necessary for detecting, identifying, and characterizing threats. This includes nuclear material production, weapons systems transfers, and movements. Space systems support military planning, mission rehearsal, and targeting; detect nuclear detonations; provide launch point determination; ensure command, control, and communications; enable precise navigation, maneuver, and weapons delivery; facilitate smart weapons selection and force coordination; and support mapping, charting, geodesy, and terrain analysis. The force multipliers provided by space forces will enhance the effectiveness of military operations to seize, disable, or destroy weapons of mass destruction and their means of delivery.

Furthermore, space forces improve the effectiveness of active and passive defenses measures. U.S. armed forces must be prepared to conduct operations against potential adversaries equipped with weapons of mass destruction and missile systems. Space systems will support the operations of active defenses which can intercept ballistic and cruise missiles with a high degree of confidence and prevent or limit contamination should the missile be carrying a nuclear, biological, or chemical weapon. Space system technologies are being investigated to allow cueing of missile defense forces to attacks by cruise missiles. Space systems also will support civil defense of populations and passive defenses of operational forces. Space systems provide missile launch detection; impact point prediction; target acquisition sensor cueing; battle management, command, control, and communications, and intelligence; and missile warning dissemination.

CONCLUSION

Space forces are essential for countering the post-Cold War dangers to U.S. national security interests. Space systems provide force multipliers which are critical for complementing and enhancing the capabilities of U.S. land, sea, and air forces. The force structure and modernization initiatives planned for the coming years will ensure that DoD space forces will retain the capability and versatility to accomplish their missions effectively and efficiently in support of national security strategy and national military strategy.

Mr. MURTHA. Does anybody else feel the need to make any comments? Okay.

Mr. McDade?

DEFENSE SATELLITE COMMUNICATIONS SYSTEM

Mr. McDADE. Mr. Chairman, thank you.

Dr. Quinn, let me take you back to the Department's deliberations in November–December and putting together the 1995 budget. OSD—not your office but elsewhere in OSD—proposed transferring funding and management of the DSCS ground segment from the Army to the Air Force. I understand the decision was then modified. This Committee has great interest to keep the Army involved in the program in fiscal year 1995 and it is reflected in your 1995 submission that the Army would continue to do the ground functions for the DSCS program. However, we are uncertain for fiscal year 1996 and beyond about who is going to manage the DSCS ground segment.

Is that an accurate statement of the current state of play?

Dr. QUINN. Yes, as far as I know at the moment. It has been returned the way that it was. The Army is still the manager of the DSCS ground segment.

Mr. MURTHA. What did you say?

Dr. QUINN. The way it was, the Army was the manager of the DSCS ground segment in the past responsible for providing the ground segment and that was the issue with the funding of those terminals and the upgrade of the program that was at issue. I think we have corrected that and that program is now ongoing. But I think we are always looking at what is the best way to provide the management and operation of these satellites and consolidate wherever you can, but there hasn't been any change in that at the moment.

Mr. McDADE. So your office would still favor the Army as the manager of the ground terminals of the program?

Dr. QUINN. Yes.

Mr. McDADE. The Committee took interest in trying to make sure that that program which appeared to us to be well run and well managed stayed on track. Why do you think the Army should continue to manage that? What is your rationale, please?

Dr. QUINN. When we first established the communications satellite programs, the different responsibilities for the systems were divided between the Air Force and the Army primarily and the Air Force having responsibility for the space segment and the Army having responsibility for all of the ground terminals, the Navy then, of course, being responsible for shipboard terminals and wherever airborne terminals were involved, that would be handled on a case-by-case basis.

The Army then developed the capability to do that and over the years has acquired all the ground terminals and when any other service needs ground capability, they give money to the Army and give the Army their requirements and they buy the terminals for them. The process has worked well in the DSCS in particular and so unless you can achieve some great savings by consolidating or make inroads into improving the way the system is managed, it has worked reasonably well the way it is.

It is always useful to continue to look at it and see if there is a better way to do it.

Mr. McDADE. Everybody wants you to improve. This is often cited to us as one of the premier examples of joint service initiatives and I guess your statement agrees that it is working well, that it isn't broken, and it is a joint service initiative that has worked well and shown a proven track record?

Dr. QUINN. Yes.

Mr. McDADE. Okay.

I have a couple of more questions I would submit for the record.

MILSTAR PROGRAM

Let me ask this question please.

The Milstar program, for whatever reason, seems to be taking on a life of its own. I noted yesterday in the Senate when they were deliberating their budget resolution, Milstar came up as a relic of the Cold War. That is the phrase that seems to be repeated as we look at downsizing. The critics portray Milstar as a relic, unnecessary in modern times, but just a relic of the Cold War and therefore not necessary.

What is your response to that?

Dr. QUINN. I would say rather than say that the Milstar has taken on a life of its own, these cliches are generated by people and then they begin to take on a life of their own and that is what happened here.

Mr. McDADE. Bumper sticker mentality, we call it.

Dr. QUINN. Bumper sticker mentality.

This program is not a relic of the Cold War.

Mr. McDADE. Why isn't it?

Dr. QUINN. Because the acronym itself, the T means tactical capability and the satellite always had both a strategic and tactical role. Now it is true in the earlier phases of Milstar when it was intended to contribute toward the nuclear capability and our nuclear deterrence, that there were features of the satellite that were emphasized to take on that role. However, there was always tactical capabilities on that satellite and the Joint Terminal program, I think, is ample evidence of that.

The Navy always had a terminal program to use Milstar as did the Army; so there were tactical programs in being as the satellite was developed and still are and those tactical terminals are being developed.

What has happened over the years, as the threat has changed and the environment has changed, we have re-examined the program on several occasions. This committee has been instrumental in suggesting re-examinations and I think that we have always responded to those and we have readjusted the program and restructured it.

A few years ago, we made a major change in the program to emphasize the tactical capability, and to that end, we added to it a payload which is called the Medium Data Rate Payload, which will enhance the tactical capabilities beyond what it already had. Its tactical utility to the war fighters will be far more in the future than it was under the previous arrangement. It will give war fighters a capability on the battlefield where they are assured to have communications and the lessons learned from Desert Storm are always used as an example of where we need improvements, et cetera.

In that case, we did have communications, things went quite well, but it was in essentially a benign communications environment in terms of disruption. No one tried to disrupt it.

Mr. McDade. Milstar can't be jammed or interfered with?

Dr. Quinn. That is correct. Milstar provides an anti-jamming capability——

Mr. McDade. So when you say you are assured communication——

Dr. Quinn. It will provide the communications in the face of any adversary's attempt to try to deny the communications and that is not true of any other satellite or communication system that we have. This is something that the war fighters have said for years that we need and we are finally going to provide that capability.

I also suggest that our adversaries learned something from the desert war as well so that in the future there may be more serious attempts to disrupt communications than there have been and we better be prepared to deal with that.

When we say it is survivable, it is survivable against the largest threat that one could bring to bear on that satellite for the communications channels. It is a very wide band system, but what people are frequently not familiar with is the fact that most of the bandwidth is used to achieve anti-jamming so that you can have communications between the commanders on the battlefield and the higher levels of command and jamming signals can be brought up against this and the satellite would be totally transparent to that. The commander would not even know it was going on.

So we went to extreme lengths to provide a truly war-fighting capability in a satellite communications system which is something we have never had before and won't have until the satellite is deployed along with the terminals for it.

I might say a few words about the way it all fits together We do have an architecture that I think makes good sense in that at the lower end of the architecture, we have UHF satellites and commercial capabilities which will deliver what we call the general-purpose satellite communications. We then have a capability called the core requirements, meaning these are war-fighting support requirements and they are essential, but not as essential as the hard-core requirements.

Finally, we have this small portion at the middle which are hardcore, war-fighting requirements without which the war couldn't be successfully conducted, and that is where Milstar comes in, and nothing else can do that. There is no commercial capability that one can adjust in any way——

Mr. McDade. Let's go back to the Gulf War and try to get a scenario. A lot of my colleagues approach me with questions and say "Suppose we had a system which would detect early on a SCUD attack by the follow-on to DSP.

You are able to locate it immediately and through the system communicate to the battlefield commander the location so he could attack it. You take Milstar out of the middle and you wouldn't have that ability to transfer that kind of communications, would you?

I am asking you for some examples that would be fleshed out that would show how a battlefield commander would rely on that hard-core usage of the satellite to do his fighting?

Dr. QUINN. As the forces were on the move—and that is one of the things we are trying to deal with is rapid escalation of the war and getting it over with—and they found that as the forces moved, they outran the communications capability and having to stop and set up these large communications systems, where the Milstar would provide that communications much more rapidly and the commander would be able to maintain communications and keep in touch with higher echelons as they proceeded and we would not have that deficiency with the Milstar in place.

That is one example that the commanders offer as a need. The other is having to guarantee communications that is not going to be jammed so you are in total communications with the total force.

Mr. MCDADE. Suppose that the forces that say it is a Cold War relic were to prevail. Assume that, and you didn't have a program like this to look forward to and battlefield commanders to rely upon, what would the world look like if it were not able to be used? What would we be sacrificing from the standpoint of our military capability?

Dr. QUINN. I think we would be sacrificing the capability of the war fighter at the front to stay in communications with the command authority and the forces executing the battle.

Mr. MCDADE. He would be separated from his intel and general war planners. What else would happen in your opinion?

Dr. QUINN. That alone is a pretty serious matter, to sever the communications link for whatever purpose. In that case, no matter what extreme extent an enemy would attempt to jam and deny communications, this thing would see right through it. There is no other way that can be done and there is no other way that you can do it quicker than doing the Milstar.

We have looked at this satellite. I would submit that it has been examined, analyzed, reviewed, more than any other program that we have in the Department in terms of people attempting to find flaws in the way that it is being executed. I think if there were flaws in it or if there was a fatal flaw, it certainly would have been found by now, and it hasn't been.

Our most recent examination of that was during the Bottom-Up Review. People always arrive at the conclusion that this is an essential capability that the war fighter needs. We wish dearly that we could provide it a lot cheaper, but there is no way to stop this program and then start a new one or change it and get the capability there earlier.

That doesn't mean we shouldn't examine ways to inject new technology and see if we can't do it cheaper in the future, but at the moment it is the quickest way to get this capability to the war fighters if they are ever called upon to use it. We will examine ways to put new technology in.

I hear people using terms like we are going to use commercial technology and inject that and get the satellite there a few years earlier. There is no EHF commercial technology of this type. This program developed the EHF technology that we have available today. In the early eighties, there was no EHF and we had to develop that technology. So clearly it is 1980s technology. But there isn't anybody else developing technology for EHF purposes.

I would further say however, the attractiveness of short wave lengths and the processing and the things that can be done in that band width will indeed become attractive to the commercial community and from Milstar other things will be derived and in the next decade there will be commercial technology, and then we will take advantage of that. But it doesn't exist today as it does in the UHF world, the SHF world and in the longer wave lengths.

There is a lot of other commercial technology that we should take advantage of that and our programs are geared to do just that. But in the millimeter wave and EHF, there isn't any EHF technology that we can take advantage of.

General MOORMAN. I would like to comment. If you were going to stop Milstar, most people say that you wouldn't stop it until you had a minimum operational capability on orbit. So, you would fly the next one, which is scheduled for next fall to winter time frame. You would not have the capability probably until around 2005–2006 time frame for some other kind of EHF system.

I don't know anyone—and I say that with a capital A—anyone who denies the need that we have to have EHF capability for anti-jam, low probability of intercept. The debate always centers around the cost and affordability, but it would be some time before you could have that capability if you decided to take precipitous action on Milstar.

Mr. MCDADE. No one denies the principal need, the basic premise that you are operating on?

General MOORMAN. That you have to have EHF. Nobody in the military is making that statement.

Mr. MCDADE. Thank you.

[CLERK'S NOTE.—Questions submitted by Mr. McDade and the answers thereto follow:]

DEFENSE SATELLITE COMMUNICATIONS SYSTEM (DSCS)

Question. Is the DSCS Ground Segment (including procurement, personnel, O&M and RDT&E) fully funded in fiscal year 1995?

Answer. Yes.

Question. For fiscal years 1996–1999, is the DSCS Ground Segment fully funded? Provide the currently programmed budgets for the DSCS ground Segment by program element or line item and any projected shortfalls.

Answer. Yes. The Defense Information Systems Agency just completed a review of the DSCS Ground Segment program and verified that it does satisfy minimum sustainment requirements.

Current budgets are:

[In millions of dollars]

	Fiscal year—	
	1994	1995
RDT&E	31.9	32.3
Procurement	111.2	95.0

[CLERK'S NOTE.—End of questions submitted by Mr. McDade.]

INDUSTRIAL BASE

Mr. MURTHA. As I understand it, General, you have been assigned to look at the industrial base of the space program. I have asked Mr. Visclosky and Mr. Livingston to work on that particular project because we think we are going to have to make some very basic decisions this year. We realize there is a shortfall. We think it is larger than Dr. Perry has suggested and it is not only in space.

There is an overall shortfall in defense. We think it could be as high as $50 billion rather than $20 billion. We want to save as much money as possible up front because we don't see acquisition savings being at the level predicted by some people. Some of the programs would have to fall by the wayside. We want to stop those programs well in advance if possible.

If you have recommendations we would appreciate it if you could share any information with Mr. Visclosky and the Committee before the mark-up so that we could make a judgment on these programs in advance and perhaps save a substantial amount of money for the government.

[The information follows:]

The recommendations of the launch study group are currently being staffed within OSD, JCS, NASA, the NRO and the Air Staff. As each of these agencies participated in the study group and had representation on the steering group, we anticipate that the staffing of the final report will be expeditious.

Mr. Deutch will be the signatory. It should be noted that Mr. Deutch has elected not to make a specific program option recommendation, but rather use the options developed by the study group as the basis for the FY96 budget deliberations.

General MOORMAN. I can talk about industrial bases at this time. Clearly one of the big issues in industrial base is you are cutting back defense and our Air Force Materiel Command did a study last year saying we have cut 25 percent out of the industrial base in the aerospace industry.

We looked at space in the aggregate and space launch in the study. If I look at space in the aggregate, I kind of divide it into three categories: Spacecraft, payloads, and launchers.

In the case of the spacecraft business—that is the industrial base is kind of right sizing, if you will. Most people would acknowledge that we have a sufficient number of spacecraft houses, and you see in the consolidation efforts in defense that that is kind of a natural process that is underway.

In the payload side—and I am talking here about sensors and on-board processors and those kinds of things—we worry a little bit about losing capability for unique systems, particularly as we debate sensors in space, the FEWS, the space-based IR types of systems, ALARM; that we will continue to have the capability for high-reliability, radiation-hardened, high-sense systems that are produced by a very few number of people.

In the on-board processing area, as you get more sensitive systems, you have more requirements for on-board processing and more sophisticated systems.

We worry also about that. In space launch, we also have a right sizing process underway now and I mention the Martin–General Dynamics merger. That will sort itself out through the process.

Generally, I would say in the case of——

Mr. MURTHA. I personally believe that is the way to do it. I asked Dave Rodman to do a study for me four or five years ago and he was convinced that the only way to save the industrial base was by private consolidation. If the government tried to save it, we would have a real problem, so I think that is reinforcing my philosophy.

General MOORMAN. I agree.

Our study will say that we have overcapacity and too many producers in the space launch business. The only way you are going to save money is get the rate up and we have too many niche markets, too many people who provide small launch rates, stabilized stovepipe approaches to the space business.

The message I want to leave with you is that while in the spacecraft side and launch side the industrial base seems to be okay, what I worry about is the second-, third- and fourth-tier providers, the vendors, if you will.

We have a lot of people who are uniquely qualified to do certain things that are critical for those, materials or batteries or those kinds of parts, that may have only one or two producers.

We have to keep track of that. We have another demographic phenomena and that is people started coming on the space business in the late 1950s and 1960s and they are now retiring and we are not seeing a resurgence of people into the aerospace industry to resupply those folks.

That is another issue we will write up in our study, sir.

Mr. MURTHA. We would appreciate your sharing with Mr. Visclosky and Mr. Livingston any specific recommendations you have that you feel would be important to our ultimate markup.

General MOORMAN. Yes, sir.

[The information follows:]

The subject of the testimony prior to the question concerned industrial base issues, however the nature of the request seems to be general in nature. "Any specific recommendations you feel would be important to our ultimate markup and decisions." Overall, the executive summary of the Launch modernization Panel contains 15 specific findings and 15 recommendations. There are these specific recommendations contained in the report which will likely impact the deliberations and markups particularly in the near term i.e. for FY 95 budget. Additionally, the technical panel annex contains a specific section on industrial base issues.

Core space launch technology. The study found that DOD's core space launch technology program has been underfunded and lacks focus. This proves to be true particularly in the area of rocket propulsion technology. Regardless of the option chosen, the study group believes a healthy technology program is necessary to preserve future options. To that end the study carries a recommendation for a re-vitalized core space launch technology program.

Reusables. The panel found there was a general consensus on the benefits of reusability. There was, however, no consensus as to the schedule, cost, risk, and pace at which the technology can be matured. The study recommends that DOD and NASA pursue cooperative technology maturation efforts which include experimental flight demonstrations.

Russian engines. A final recommendation that could impact the FY 95 deliberations is a finding and recommendation on Russian engines. The study found that a detailed understanding of Russian engine technology could potentially lead to reduced cost of modernization.

Therefore the study recommends that DOD should lead and fund a cooperative effort including NASA and industry, to investigate the use of Russian engines/technology in future ELVs. A prime candidate would be the test of an RD–170 engine.

Technical Panel annex findings on industrial base. Overall, the study found that DOD and NASA demands for launch will minimally sustain the industrial base. The study found that continued production and an expanded technology program will place U.S. industry in a position to meet future space launch programs. The expanded core technology program mentioned in the main Executive Summary is vital to sustaining the critical engineering skills referred to in the testimony.

A detailed briefing of the entire report's finding and recommendations will be presented when the report is formally presented to Congress in late-April.

Mr. MURTHA. Mr. Dicks.

DEFENSE SUPPORT PROGRAM AND ALARM

Mr. DICKS. I want to welcome the witnesses.

During a recent trip to Korea, the issue was raised regarding the lack of theater capabilities. One of the issues that was discussed was the current DSP system and whether there was anything that we could do by accelerating a launch of a DSP replacement satellite that would give us better detection capability against potential missiles, I assume SCUDS or No Dongs out of North Korea.

I am told that the current constellation has certain defects and that unfortunately the launch schedule is rather drawn out here, and we are not going to have a new satellite launched until some time next fall.

General MOORMAN. Yes, sir.

Mr. DICKS. Is this a problem? Would we enhance our early detection capability if we put one or two additional DSPs up at an earlier point in time?

General MOORMAN. The problem we have, as you correctly point out, is the Titans in the near term are generally spoken for with other satellite systems. As you may know, the Air Force accordingly has been negotiating with NASA to look at the possibility of being able to launch a DSP on the shuttle. That is one of the very few systems that still can fly on the shuttle.

There has to be some modifications to it and it will cost us to launch on the shuttle, but that is an option.

Mr. DICKS. Is this a real problem or not?

General MOORMAN. Yes, sir. It is a problem in detectability. Our satellite focal planes are getting warmer and we want to have a full-up constellation that can be the best that the sensor can provide.

Mr. DICKS. When are you going to make a decision? It seems these problems drag on despite meetings and meetings. Will there be any decisions made on this? Is there any sense of urgency about doing anything?

General MOORMAN. We have been pushing it very hard from Air Force Space Command. The issue will resolve around cost. I do not have a date for resolution.

Mr. DICKS. Keep us informed.

[The information follows:]

We evaluated launching DSP flights 17 and 18 on the shuttle. DSP Flight 17 will launch on a Titan IV in ———. This launch date meets our requirements, therefore there is no longer a need to pursue a shuttle launch for DSP.

Mr. DICKS. We have been through so many different programs. Now we are having the latest rendition. We are going to now cancel DSP–24 and take DSP–25. We are going to do DSP–23. We are now getting rid of FEWS—what was that before?

General MOORMAN. BSTS, sir and before that AWS.

Mr. DICKS. This is almost a joke. Now it is ALARM. Are we ever going to make a decision and stay with it? I think it is embarrassing that we get change after change after change on these issues and I am not yet convinced that you know what you are doing.

What is ALARM going to give us? Why are you moving from FEWS to ALARM? This Committee needs to understand why this addition was made.

What is the basis for change? This is the fourth reiteration of this thing.

General MOORMAN. You are quite right. Your litany of the programs and the early warning business does go back to the early 1980s with AWS.

Mr. DICKS. We have spent a lot of money on these various options that we then cancel.

General MOORMAN. Yes, sir. The expense for the systems that we have looked into in the 1980s, for example, I think, is about $2 billion in technology for that. The good news about that is that the ALARM system is a very low-risk system as a result of that investment in BSTS, as you might expect.

As I think you know, FEWS was cancelled, not that people didn't believe we had the requirement. It was cancelled because it was believed to be unaffordable. Thus ensued a study to see if we could capture some of that capability because, speaking on behalf of CINCSPACE, the current system does not provide the sensitivity nor the revisit that is required to meet either the current threats or the projected threats.

As a consequence, we went into the ALARM study to try to get this technology in space in a more time-phased manner to give the war fighter that kind of capability to deal with the evolving tactical ballistic missile threat. We think we now have a program that makes sense in that regard—one with preplanned improvements that could satisfy the violated requirements which FEWS would have met.

I share your concern——

Mr. DICKS. It does not generate much confidence. How long will it be before you come back and cancel ALARM? If that is true, if there is such instability and there is such a lack of certainty here, why are we then cancelling DSP 24? What is the cost to protect the option to do DSP–24 in this budget?

General COGLITORE. It cost $5.3 million to protect that option for the remainder of this fiscal year.

Mr. DICKS. How many DSP's do we have that have not yet been launched?

General COGLITORE. We have six in the barn.

Mr. DICKS. Including DSP–23?

General COGLITORE. That would be the seventh and DSP–24 would be the eighth.

Mr. DICKS. You are telling us that we are not going to have ALARM until 2004.

General MOORMAN. Yes, sir.

Mr. DICKS. That is 10 years from now.

General MOORMAN. Yes.

Mr. DICKS. If we have a problem and everybody assumes that these satellites are going to be perfect and going to last longer than they have in the past, but if you have a launch failure, does the number of seven really cover us for a decade? Could somebody explain that to us?

General MOORMAN. We sliced and diced that six ways from Sunday. The man who is responsible for that mission for the country in providing warning examined that in great detail—General Horner—and said he believed that that was an acceptable risk.

His proposal was to launch ALARM in 2002 and cancel DSP–23. It came back to the Pentagon. The decision was made to buy DSP–23 as insurance and slip ALARM two years, but in the Generalized Availability Program (GAP) analysis and the coverage analysis, we went into great detail.

General Horner, the guy who is ultimately most responsible for that, is very comfortable with that risk.

Mr. DICKS. Okay.

Mr. LIVINGSTON. Would the gentleman yield?

Mr. DICKS. Briefly, yes.

Mr. LIVINGSTON. For the last four weeks, I have heard the term acceptable risk no fewer than ten times and it covers the gamut. It seems like everything that is coming out of the Pentagon is subject to an acceptable risk.

In this instance, I can remember when I was on the Intelligence Committee between 1982 and 1988 that they told us very clearly that DSP wasn't going to give us adequate coverage and that even if we enhanced or kept building DSPs, there were still big gaps in the world and that the only way to follow on then was the predecessor, which was Boost Surveillance and Tracking System (BSTS) then.

Admittedly the world has changed and I suppose you have to recognize that you do have to gamble a little bit, but with the proliferation of nuclear weapons in the hands of rogue States, we are not talking about the massive onslaught of weapons from the Soviet Union anymore. We are talking about one or two nukes coming across the border.

If there are gaps in DSP and we don't have any follow on for the next ten years, I think that is a hell of a risk, not an acceptable risk.

General MOORMAN. When I say acceptable risk, it is looking at the probabilities——.

Mr. DICKS. The possibility of covering this with seven DSP's that you have under construction?

General MOORMAN. Yes. I think General Horner would say that what he is most interested about is getting off of DSP, because it cannot see the threat.

Mr. DICKS. What can't DSP see?

General MOORMAN. It cannot see——.

Mr. MURTHA. This is unclassified now.

General MOORMAN. I will give you a general comment and then I would like to talk in a closed session, if I could.

It cannot see certain classes of tactical missiles that don't burn as brightly or as long.

Mr. DICKS. So where does Brilliant Eyes fit into all of this?

General MOORMAN. Brilliant Eyes, I believe, is still a major acquisition system. It is in the Air Force Acquisition System for FY94. They are funding it around $120 million to $150 million a year. They are planning to down select to a single contractor soon, to fly a demonstration in 1998. Down selection has been delayed by OSD.

Mr. DICKS. What is Brilliant Eyes going to give us?

General MOORMAN. DSP sees the missile picking up the plume from the rocket. Brilliant Eyes will allow you to look at the missile against the cold background of space and track it mid-course. That will give you much more accurate launch point locations and will also tell the ground-based shooter much more accurately where you are and it also provides an extended range for the ground-based radars and the missiles.

Mr. MURTHA. Where you are or where it is going?

General MOORMAN. Actually both, Mr. Chairman; launch point accuracy and launch point precision, and basically it is extending the range of the shooter because you are getting over-the-horizon targeting.

I need to qualify that this is for missiles in excess of 600 kilometers and most people think that ultimately you will see a proliferation of longer-range theater missiles. It will cover that. It will make your ground-based systems more effective.

Mr. DICKS. Now let's switch.

Mr. MURTHA. If the gentleman would yield on this issue.

With more and more Third World countries getting into the business, how are we overcoming that kind of a threat?

General MOORMAN. I think that is the compelling thing that leads you to an ALARM system; that is, the things that are likely to proliferate are tactical or theater ballistic missiles.

Mr. DICKS. You are telling us the reason we are not moving out aggressively is affordability?

General MOORMAN. FEWS was basically an affordability issue.

Mr. DICKS. You are going to make it cheaper. I have never seen you do that well in any area, especially like space launch. In the old days, we were going to reduce it by 90 percent. We were going to have a small production center going to do it on the cheap. This is another example of the credibility of this space group.

General MOORMAN. The affordability issue was not that we are going to make it a lot cheaper, although ALARM will be. It was affordability of the amount of money you had in the budget to address this issue.

Mr. DICKS. So now we are going to do it better and cheaper?

General MOORMAN. Not better. We are taking things off of ALARM from FEWS.

Mr. DICKS. For example?

General MOORMAN. The on-board processing, crosslinks the direct event messages to the theater, those kinds of things.

Mr. DICKS. Let's go to the space launch.

Mr. YOUNG. Just a second. I want to make sure I heard correctly what you just said. You are going to take those capabilities off of ALARM? The on-board processing and the——

General MOORMAN. Yes, sir, and put them back on in a preplanned product improvement (P3I) program later in the program.

Mr. YOUNG. How much later?

General MOORMAN. It is phase three, probably the latter satellites; 2010.

Mr. YOUNG. I apologize for interrupting——

Mr. DICKS. I think the gentleman is correct. Is this a major downgrading of this system?

General MOORMAN. No, sir. I don't believe it is a major downgrade but rather a more affordable phasing of capability. The sensor suite with more sensitive detectors remains. The other big thing about the ALARM system is it will be on a medium launch system. Your comment about the cost of launch——

Mr. YOUNG. One of the major things we learned in Desert Storm about this type of activity was that on-board processing and better communication to the field was essential and we were planning to improve that. Now with ALARM, you are telling us that we are going to take those capabilities off. You don't have a good feel for when we are going to have them on the further programs?

Mr. DICKS. The other point that worries me a little bit is that every program takes longer to do than when you first come in and tell us about it. So instead of stretching out ALARM, it seems to me you ought to accelerate ALARM and try to do it more rapidly, knowing full well you are going to run into difficulties.

It is this lack of money that makes you take what I would consider very, very long schedules, 10 years—if that stretches to 15, we could have a serious problem.

Mr. MURTHA. If the gentleman would yield. We are concerned as to whether you are taking into consideration the potential nuclear threat. We worry about Korea and Iran or any of these Third World countries developing a nuclear-deliverable warhead.

We have a real deficiency here during that period of time and it doesn't look like an acceptable risk. It is all affordability.

General MOORMAN. The only case I can make for you, sir, is that the CINC, who is normally the most conservative person in the world, has looked at that because he is so anxious to get in a new capability in the field.

Mr. MCDADE. Isn't it true that he took that position after FEWS was cancelled? Wasn't FEWS his number one priority?

General MOORMAN. Yes.

Mr. MCDADE. The program was cancelled and he was told, "Your number one priority is out," so he tried to do his best.

Mr. DICKS. Some people say the only way you guys will do ALARM is for us to kill DSP, so there is no turning back. What do you think of that?

Dr. QUINN. That is another cliche like not cutting off your nose to spite your face?

Mr. DICKS. You are cancelling it after 23.

Mr. QUINN. There is a history of how we got where we are, including the SDI program and the consolidation of surveillance programs. That program went away, but the recognition of the need for the DSP kind of thing was still there and that is why the FEWS program was brought on, to become a more capable system. The fiscal environment has changed and during the most recent review, the decision was made to cancel FEWS as rapidly as possible and bring on a new capability called ALARM to pick up the kind of things FEWS would have done, but with a substitute that could be launched on a medium launch vehicle to keep it in the affordable window of the budget.

TITAN IV

Mr. DICKS. The TITAN IV has become the most expensive—you say $250 million to $300 million. Some people have projected into the future that as people get more and more concerned about the cost per launch, everybody tries to get off TITAN IV, so the cost goes up even higher, kind of a death spiral in reverse.

Is that a legitimate problem and what are we trying to do about it? Are there technical problems still with the TITAN IV program?

General MOORMAN. I wouldn't say there are technical problems still with the TITAN IV program. It could be classified to a degree as still in development. We have had eight launches, one failure. It is hard to imagine TITAN ever being what we would classify as a real operational program, like what General Horner and I would like to see in our launch bases.

The cost of TITAN—when we began this launch study, that was an area we wanted to look into because the projection for that is fewer and fewer TITAN launches, because people are getting off of it and satellites are lasting longer. We have examined that in spades.

I would like to talk to the committee in a closed hearing to describe some of the demands and characteristics of the payload that require heavy lift and some of the difficulties in getting off of TITAN.

We will conclude that the earliest you could get off of TITAN would be 2007 and likely 12 because of the requirements of the payload design. I started this study with the fervent belief that I could make that happen and I could figure ways to get off Titan IV.

Frankly, you have a range of lift capabilities with TITAN and a range of capabilities with Atlas, the next lower-most capable booster. The difference is about 10,000 pounds between those two boosters.

Our view is somehow we have to get to a point where we close that gap, where we offer a range of opportunities, a family of vehicles, if you will, so you can get the production rate up rather than where TITAN is today. Ultimately, we are down to 1 or 2 launches a year. We have to be up above 20 or 30 launches a year, and that is for all of our launches—production rate increases that is the only a smart way we get the price down.

I would like to talk to you about some of the things we have discovered during the course of the launch study.

Mr. DICKS. Is this study—again we are trying to find an affordable space launcher?

General MOORMAN. Yes, sir.

Mr. DICKS. We have been doing this for a decade, haven't we?

General MOORMAN. This is the fourth study on launch that I've been involved with. This particular one was directed by the 1994 Defense Authorization Act, and the congressional language was in response, I believe, to the Defense Department's decisions on the Bottom–Up Review. I want to make clear that I am doing the study on behalf of Mr. Deutch and we are involving all the communities that have an interest in space launch.

We will report to the Congress in late April.

Mr. DICKS. Thank you, Mr. Chairman.

ALARM

Mr. MURTHA. Please give us some estimate of what it would cost if we were to become convinced that affordability is not as important as moving up ALARM. We would like to see some figures that might speed up this system if we become concerned at some point that the threat is greater than you or General Horner thinks.

I realize the whole thing is built around affordability, but give us some figures about perfecting the system.

General MOORMAN. We can provide that for the record.

[The information follows:]

During recent reviews within the DoD an alternative to accelerate ALARM to provide first satellite delivery in 2002 vice 2004 was evaluated. While there was no serious technical problems identified to preclude a 2002 delivery, the estimated cost for this option was $587M more (through FY99) than the current option being pursued. This increased cost could be partially covered by cancellation of DSP 23 (no longer needed if ALARM delivery is 2002) which would save approximately $490M. However, the DSP 23 savings would be in FY94 and FY95 while the large funding shortfalls for this option are in FY96 and FY97 ($102M and $262M, respectively). The option of first delivery in 2004 was selected because it was the earliest the satellite could be delivered given the funding available.

Mr. MURTHA. Mr. Young.

Mr. YOUNG. Thank you, Mr. Chairman.

I wanted to change the subject and go to a different issue altogether, but your response to Mr. Dicks on the discussion of DSP, FEWS, and ALARM, et cetera, alarmed me because I thought you were here to tell us that ALARM will be a fantastic new system that will do things DSP wouldn't do.

General MOORMAN. I was answering a question on the differences between FEWS and ALARM. Let me emphasize that the majority of capabilities in FEWS are captured in ALARM. There are some things we have taken off.

Mr. YOUNG. Those are the things that concern me because this committee struggled with those witnesses who came back from Desert Storm to tell us that on-board processing and immediate downlink capability was something they really needed and those are the two things you have told us will not be part of ALARM.

General MOORMAN. We are dealing with that by making warning improvements to the ground processing system to get the warning more quickly into the field. We are talking about the difference here in terms of less than two minutes.

Mr. YOUNG. During that discussion, you mentioned that there were some gaps in DSP.

General MOORMAN. I used the term GAP analysis. General Horner would say the seven satellites that we are going to fly and when they are likely to fly presents him sufficient DSP coverage to go ahead with the ALARM.

Mr. YOUNG. Aren't you having problems with DSP now, some power problems in the bird itself?

General MOORMAN. Sensitivity problems, but I am not aware of any major power problems—milstar has a power problem, sir.

Mr. YOUNG. DSP doesn't have any on-board problems?

General MOORMAN. No, sir, the constellation has some problems. As I mentioned to you, it—over time the focal plane heats up and you can't see all the things that the system was designed to see.

MINUTEMAN III

Mr. YOUNG. What I wanted to talk with you about was your prepared statement. You make a strong case for keeping the Minuteman III portion of the triad.

I want to quote you. You say that—despite changes in the geopolitical situation, our Nation has a continuing need for the current value of our ICBM forces—."

You point out that the ICBM force played a big role in Desert Storm. Is it safe to say that because of the threat to the nation that we need this leg of the triad?

General MOORMAN. The Air Force Space Command view is, we will continue to need the ICMB force out to at least 2020. I also point out in the statement the relative role between ICBMs and bombers will be reviewed as part of the Nuclear Posture Review.

Mr. YOUNG. Do you have a feel for how long we are likely to face the threat that the triad, the three-legged triad, is supposed to deter or to counter? Some are suggesting we eliminate one leg of the triad.

General MOORMAN. Some are suggesting that.

Mr. YOUNG. The one leg they are suggesting eliminating is the Minuteman III.

General MOORMAN. I don't have much insight to the Nuclear Posture Review at this time, but you are quite right; there are those who are suggesting that.

Mr. YOUNG. The suggestion is that we could save the money in trade-off and have more bombers. Do you have a reaction to that?

General MOORMAN. No, sir.

MAJOR REGIONAL CONFLICTS

Mr. YOUNG. I want to ask the question I have asked all the CINCs that have been in and the Joint Chiefs and the Vice Chiefs, and that is in the Bottom–Up Review that Mr. Aspin conducted, it was determined that the Defense Department would be reduced, restructured, modernized, hopefully to the extent that we would be able to meet two MRC's, or major regional conflicts, almost simultaneously.

I have asked this question: "Do you feel comfortable with that?" And let me just say what General McPeak said. He said "I would feel a lot more comfortable with one big one and one little one."

The witnesses indicated yes, we can meet the two, but with our fingers crossed, and maybe we can and maybe we can't. How do you feel about strategic space systems? Would you be in a position to handle your responsibility in two MRC's?

General MOORMAN. Yes, sir. I think the space capabilities can. I think we have pretty capable space systems, but I would like to modernize them and the best example, the CINC No. 1 requirement, is the warning satellites.

I believe the front end of MRCs could be preceded by a tactical missile attack and General Horner worries about being able to see it and warn against it.

Mr. YOUNG. We are seeing a growth in potential enemies' capability, North Korea, for example, with the No Dong. I understand they have gone beyond the No Dong and are working at developing additional capabilities, extra range, accuracy, et cetera.

I agree with what you said and I hope we can work out these problems specifically on being able to detect the launch and more accurately determine the probable impact area.

General MOORMAN. Korea is an area that you worry about because of the weather. These follow-on warning systems such as ALARM, allow you to deal better with the weather problem.

Mr. YOUNG. Thank you, Mr. Chairman.

Mr. MURTHA. Mr. Visclosky.

LAUNCH VEHICLES

Mr. VISCLOSKY. Thank you, Mr. Chairman.

General Moorman, to get back to the TITAN IV and the whole launch issue, my sense is there are two parts to the equation. You talk about the payload that has to be launched as well as the launch vehicle. In the report that you are preparing for April, I assume that both sides of that equation will be covered?

General MOORMAN. Yes, sir; most assuredly. We have talked to everyone who builds satellites and who has demands for launch services to try to fully understand the spectrum of needs. As a matter of fact I would comment that what you will see in our report are a series of options that are driven by payload transition dates; that is, the view of our study group is it does not make sense to propose new launch systems if they don't also correspond to block changes or new satellite, new starts.

Otherwise, what you are doing is paying the transition cost for a satellite twice, for example. So we are very much driven by windows of opportunity for when you would want to have new launch systems and these windows correspond to when you might have new satellite systems.

Mr. VISCLOSKY. Would I be correct in assuming that you have three broad choices on the launch vehicles? One is to upgrade what we have. The second is a technical evolution of what we have; and third, then, if you would, a "leap frog" to try some other approach.

Would you care to comment on the pros and cons of each of those——

General MOORMAN. If I could qualify slightly. We are looking basically at kind of four options. One is the baseline, the President's budget, which calls for austere upgrades to current launch systems. That particular option allows you to fly the mission model. You don't get great improvements in cost or great improvements of operability.

The second option we are looking at is evolving our current systems, that is evolving the Delta, the Atlas, the TITAN, so that they can cover more than just their niche markets. The launch contractors have come in to us—not only the existing or traditional contractors, but others as well. These proposals give us some hope that this will offer the nation some significant advantages.

The third is a complete new sheet of paper, a clean sheet of paper, new pad, new process, new vehicle. I call that the Evolved Expendable Launch Vehicle. Variations of this idea have been called several things over the years, Advanced Launch system, National Launch System, most recently Spacelifter. But that is an entirely new system.

Finally, there is the leap frog, as you point out, and this option would build, some kind of reusable system like a single stage to orbit. Baseline is the cheapest alternative to develop and the new reusable system is by far and away the most expensive.

So there are cost pros and cons as you go up that line. There is also risk. That is ranged in an ascending risk, technical, schedule, programmatic risk. Baseline is the least risky, while the reusable has significant risks. Also you get improvements in operability; that is being able to launch when you want and launch on schedule or launch on need.

A reusable vehicle offers significant improvements in operability. The problem is affordability, of course. We will have all those arrayed for Mr. Deutch to look at and to make a decision on what he wants to do with the fiscal year 1996 budget, but you have characterized the options pretty well. I just modified them a bit.

Mr. VISCLOSKY. The impact would be on your 1996 budget from your perspective?

General MOORMAN. Yes. We will make suggestions on 1994 technology—primarily the ARPA money that the Chairman referenced—and we will also make recommendations on 1995 technology; because one of the things that our study would point out is we haven't done as well on funding and focusing our space launch technology in the Department as we should have.

Mr. VISCLOSKY. There is speculation that we have lost our edge in the commercial market as far as launch vehicles, and again general speculation that the French, Chinese and Russians have an advantage over us. Would you care to comment on that? Is that a cost advantage? Is that a scheduling advantage? Are there other factors that we ought to be concerned about?

General MOORMAN. Your point is very well taken. We used to have a monopoly in launching back in the 1979–1980 time frame. When Challenger went down, we didn't launch anything for 31 months with the shuttle. We also had Atlas and TITAN failures at about the same time and the French had the Ariane vehicle coming on line. They captured 60% of the market share and to date we have been unable to recapture much of the market.

We have really looked at the commercial marketplace, decisions on what launch vehicle to launch. Basically the choice of a launch vehicle for commercial communications satellites are based on a lot of factors. One, as you point out, is cost or price, and we are being under priced. If I look to the future with command economies like China and like Russia—China offering the Long March and the Russians offering Protons or Zeniths. Who knows how they will price because they can offer whatever price they want?

The launch decision is also driven a little bit by international affairs. Many of these communication satellites are part of international consortia, and hence sometimes the satellite builders or his agent from a certain nation may want to procure an undigenously produced rocket or a rocket produced by a country in a particular consortium. For example, Ariane is a vehicle built and launched for the European Space Agency, so you make decisions based on politics and you also make decisions on competitiveness and diversity.

International consortia want to keep a lot of people in the market for diversity purposes. My conclusion is that the market is relatively inelastic at this time and that we are not likely to be very competitive in that market or more competitive than we are today absent a significant change in the launch vehicle picture.

Mr. VISCLOSKY. That would be a consideration on the launch vehicle; if you pick up additional income in terms of a new launch vehicle, that has an impact on your cost structure as well?

General MOORMAN. Yes.

Mr. VISCLOSKY. In some of the areas the committee is concerned about on industrial base, submarines, tanks, there is a fairly finite market in terms of military utilization. In some of the space areas, that is not necessarily true.

Could you provide me with some of your general observations as to the role of the commercial marketplace and the concerns we ought to have about that?

General MOORMAN. I mentioned this before you came in, sir, but we will have a segment in our report on the industrial base focused on space launch. Generally we are in a situation where we have too many producers I think our conclusion would be. The reason for that is that we have satellites lasting longer and we don't have as much demand for launch services as we once did.

So what we have in a business sense is we have a market for Delta, a market for Atlas, a market for TITAN, a market for Shuttle and they are all vertically structured. We have to get away from that.

The launch business is in some ways restricting as Mr. Murtha pointed out. This is happening in a natural sense due to competitive processes. You see defense consolidation. We think that this is probably a good thing that Defense consolidates on space launch. However, I don't want to paint too rosy a picture because I think the concerns are at the second-, third-, and fourth-tier providers, the vendors. I talked earlier about a demographic problem. People are getting old, and new and young engineers are not coming into these businesses.

The other issue is that we have a lot of unique providers in the parts level. I think that George Schneiter's shop has a major industrial base study going on in space launch in addition to my study. This study will examine the second, third and fourth tier vendors.

Mr. VISCLOSKY. Thank you.

Mr. Chairman, thank you.

Mr. MURTHA. Mr. Lewis.

LAUNCH SITES

Mr. LEWIS. I have some responsibility for NASA talking about the Space Station and launch and international cooperation. As a result of that, we are presently in the process of delivering $400 million to Russia for launch activities at a location adjacent to Russia in the former Soviet Union, at a location—I understand there is serious difficulty between Russia and another country. There are all kinds of questions technically, et cetera, but we are moving forward nonetheless.

I arrived here 16 years ago, and about that time, one of the more interesting things I did was to take my father, a former contractor who passed away at age 90, to a ground breaking at Vandenberg.

We spent a lot of money developing that launch site and Challenger went down and we kind of went into neutral gear for a number of years. In the meantime, for one reason or another, we are not very competitive. What was Vandenberg about? Why is it sitting in mothballs and why Vandenberg and why Russia, for example?

You have studies going on——

General MOORMAN. In our space launch study, we have had very active participation by NASA. Although it will be a Secretary-of-Defense-sponsored study and it is very—we have spent a lot of time worrying about NASA's needs as well.

Your specific question on Vandenberg—I think you are referring to the shuttle complex there?

Mr. LEWIS. Yes.

General MOORMAN. The history is sad. We put about $3 billion in constructing the shuttle launch complex at Vandenberg. The reason is we were going to launch all our polar orbiting satellites out of there on the shuttle.

After Challenger went down, we did a lot of things to the vehicles to make them safer and we also decided not to fly the shuttle at quite the power setting. The combination of those two things led to a situation where the shuttle no longer could lift the payloads that had to go out of the West Coast. Incidentally, we are pushing the envelope of the shuttle to start with.

As a consequence, the decision was to shut down Vandenberg. On the other hand, DOD is still launching TITANS from Vandenberg. We are building an Atlas pad there for Atlas II's. We also launch Atlas E's, so it is still active.

LAUNCH VEHICLES

Mr. LEWIS. A prospective vendor came to me and talked about an idea that had been pushed in his direction relative to one of our allies, I believe it is Britain, closing down the use of Polaris missile and they were talking to this group about a contract to destroy these missiles.

The question that he raised to me is why should we not consider buying those missiles, bringing them back here and using them with some conversion, apparently at low cost, and sending satellites up by way of those Polaris?

One response that I got from that was industry wouldn't like that. That is not the question I am asking. Why shouldn't we consider that if it is a lower cost and makes us competitive and we don't have to become dependent upon others?

General MOORMAN. DOD has commented on a policy and provided an input to OSTP on that subject. If I could defer that to Mr. Klinger, it is a policy issue.

Mr. KLINGER. Sir, what we have forwarded to OSTP is a position that we will entertain the use of surplus ballistic missiles for suborbital launches, but for orbital launches on a case-by-case basis.

Mr. LEWIS. You will give me the why of that, won't you.

Mr. KLINGER. Part is domestic considerations with regard to our commercial launch industry.

With respect to harvesting, if you will, the U.K.'s Polaris system for commercial launch purposes, we are in the midst of stockpiling as a result of START I and ultimately START II drawdowns. We will have a surfeit of former strategic ballistic missiles, both submarine-launched as well as ICBM.

So I think before we would even entertain the notion—to my knowledge that has not been raised within the Pentagon about bringing back the Polaris system that the Brits are retiring as they field their own D–5 system that they are getting from us, we would have to account for how we want to do the accounting and effective utilization of the surplus Minuteman that we will be utilizing here for those suborbital and orbital launches.

Mr. LEWIS. One of the underlying themes I hear that cost is a very significant factor. We are reevaluating how we can become competitive again. It seems to me this fits in that mix; I am not sure where.

I have asked in other arenas similar questions and have not gotten a satisfactory response.

Mr. KLINGER. I will take that for the record and see if we can address that more specifically.

[The information follows:]

We have looked into the issues associated with use of Polaris missiles as space launch vehicles. These include the implications for START, since the Polaris A–3 is considered a "former type" under this agreement. There are also a number of technical considerations associated with use of hardware that in some cases is 25 years old. Our experience with converting A–3's for space launch under the Army's Strategic Target System (STARS) has shown that the costs were higher than expected and would not necessarily be cost competitive with a similar commercial service.

Nevertheless, we would not rule out the use of such excess missiles, but will consider their use consistent with the national policy we expect soon to be approved by the President.

Mr. KLINGER. As General Moorman pointed out our commercial launch providers who have the niche markets would probably be somewhat less than enthused if we were to spill out into the market—even in a restricted fashion, and that is what we have done; missiles which were long ago paid for in the case of the Minuteman force because they would better perceive it as taking away a shrinking market share from them already.

Mr. LEWIS. Of course, we have already made profit on this, so put it on the shelf so they can make profit on something else. It doesn't make sense to me if we are essentially costing ourselves out of the business not being competitive then to not some way re-examine what we have done before.

Mr. KLINGER. I would have to look at the numbers and I think General Moorman can address the question of lift capacity.

But I think where we are being outcompeted, I am not sure that use of Minuteman boosters would provide us with the lift capability to take back market share that we have lost to say Ariane IV.

General MOORMAN. The market that I was referring to is really commercial communication satellites and that is really the upper end of Delta and the middle of, Atlas class as opposed to what a Minuteman can lift.

I would say one thing, there are folks in industry, who are in the solid rocket motor business who would like to propose solid rocket approaches to improving space launch, which is kind of a variation of the question. If we ever had an opportunity for a new initiative, those folks should be in that competition.

Mr. LEWIS. It sure seems to me that in terms of our long-range defense needs, it is critical that America be in this business and be competitive in this business and one way or another we have followed several policy tracks that have almost taken us out of the marketplace and we have spent a lot of money doing it.

I am trying to get a handle from a layman's perspective how this committee and other committees on which I serve can play a role in getting us back on that track. I am not interested in waiting for six more studies to get answers. This committee needs those answers. We are shrinking budgets in the defense area and yet this is a critical subject area.

It is the administration—is the administration ready to commit real dollars to getting us back into this marketplace? We give $400 million to Russia to get involved in the space business with us, and that is a highly questionable venture, in my judgment.

General MOORMAN. Sir, I am going to have to defer on that.

Mr. LEWIS. Well, you don't have to defer on the first part of it. Is DOD ready to commit some real——

General MOORMAN. That is the question I am going to have to defer on. My job, sir, is to propose these options and to try to do it as objectively as possible and to try to plot courses of action for the Defense Department.

I will defer to Mr. Schneiter there on what the future holds for the study.

Dr. SCHNEITER. I will comment. In the Bottom-Up Review, we looked at space launch as one of the topics, and clearly the answer was we believed we could not afford to make that start for a new system that would have those benefits. We looked at the issue more narrowly than is being done in General Moorman's study. He is taking account of more factors, so one might get a different answer.

I would also note that there is a national look at this. The Office of Science and Technology Policy, OSTP, is looking at this. They have a space transportation policy study ongoing. That is timed so that it can make the best use of the results of General Moorman's study. They, too, will take into account, I think, even broader factors than General Moorman's study will.

So either of those studies could result in a different answer than the answer that we gave before, but it is at this point too early to tell.

Mr. LEWIS. Mr. Chairman, in another subcommittee I am finding that the science community in its competition relative to the Space Station is putting on such great pressure to make sure that they not only get every dollar they think they need, but every dollar they think they would hope to have and that is leading to an argument that maybe we ought to cancel the Space Station. There are major forces that shortly may make a decision to pull the plug on the Space Station.

I find spending money in Russia in a sizable form in this dawn of new peace in the world, changing world where there are no problems in the future, that we can afford to experiment with these things—it does seem to me in this area of space launch, we have to be out front; not just competitive, but number one, and we are far from that track.

I am wondering what the role of this committee ought to be in connection with that. I am concerned about it and I know that others are. While I will look with great interest at the reports coming forth, I still have questions about it.

General MOORMAN. Mr. Schneiter commented on what makes this somewhat different than the Bottom-Up Review analysis. As I mentioned to Mr. Dicks, I have done lots of launch studies and also bemoan the inability of our system to come up with a new early warning system.

In the launch study business, one of the major problems we have had is the inability to reach consensus among the three primary actors: the Air Force, NASA, and the intelligence community. I am working on that problem very hard to try to come up with a report that everyone can sign up to. Consensus is very important, because I think in the past we have not been together.

There has been no sense of unanimity. Without which anything we propose to you, I think, is doomed up here on the Hill because of the different interests and the way we process budgets. So we are working consensus very hard.

Mr. LEWIS. I think General Moorman has taken me right to the heart of the consensus we need to try to help. Unless we do get some uniformity of direction here—the business of Challenger going down and from there our deciding we are going to launch essentially our satellites of significance by way of Challenger and save that program regardless—I don't know how we got to that decision, but it didn't help with the problem we are faced with currently.

I hope that one of our thrusts would be trying to get America back in the business of being competitive in this field.

SPACE POLICY

Mr. MURTHA. One of the concerns we had last year was that there didn't seem to be cohesion, cooperation, and direction. What is your job, Mr. Klinger?

Mr. KLINGER. Sir, I am responsible to the Under Secretary of Defense for Policy, Frank Wisner, and specifically to Ashton Carter, the Assistant Secretary of Defense for Nuclear Security and Counterproliferation Policy.

Within that organization my office is responsible, among other things, for producing the DOD space policy, which attempts to capture in the form of a broad framework the direction and requirements, broad operational requirements for DOD space systems to include launch, anti-satellite activity, foreign launch trade, space launch to some degree—to the extent that there are policy issues embedded in the issue of space launch, the institutionalization of space forces and the integration of space forces into our overall military force structure.

MILITARY THREAT

Mr. MURTHA. Where does the threat come into all of this?

Mr. KLINGER. The last time we produced a DOD space policy in 1987, its foundation was a recognition of the then-extant Cold War threat. I think, rightly or wrongly, the focus of the 1987 policy—and I think it was far more rightly than wrongly—was the Cold War threat to us with regard to space from the Soviet Union.

What has happened in the last 60 months is that the world has changed out from underneath us far more rapidly in some regards than we have been able to make changes organizationally or from a policy standpoint. We are confronting at this point a vastly different landscape, both in terms of the kinds of threats that we face terrestrially, the kinds of threats that we face to our own space assets, and the interrelationship between those two; namely the contribution that space could make to coping with threats on the ground, in the air, and in space.

Mr. MURTHA. I get the impression we are being driven here by affordability rather than by actual military threat. How much are military threat and affordability driving this program? This is a $13.5 billion program, from what we can tell, including all the classified assets.

How much are you driven by the actual threat? Almost everything that has been talked about today is in line with what is affordable, and as Mr. Livingston pointed out, acceptable risk, and that concerns me.

Mr. KLINGER. Yes, sir.

Let me caveat for both your benefit, but maybe mine as well. I am the newest member of the four witnesses here to the space business. I have come out of six-and-a-half years in the strategic nuclear business, so that my answer will be informed only by several months of direct experience in these issue areas.

I think you are correct, I think that all the witnesses would agree that we are driven at the moment by extreme and even more binding fiscal constraints. The decision rules have changed for us across the spectrum of things that we do in the Pentagon with the demise of the Soviet Union. Things that would have been unthinkable in terms of cutting them a short time ago are routinely not only looked at but come under budget reductions because flatly we are out of money.

I think you have heard some level of discomfort voiced by some at the table with regard to the way programmatically we have done various things with regard to space. Your question to me is where is the threat, and I guess my answer is we are trying to figure that out right now.

One of the things that we are trying to do is to figure out what are the implications of the changes in the way the world looks, a world in which we are no longer worried about the Red Army crossing the north German plain, but worried about SCUD attacks in day one of a war in a place where we have no forward presence. We are trying to figure out what the changes mean for our space forces.

Everybody looks at the lessons of the desert and you can probably find any lesson you want there. The lesson I take is that Desert Storm is the wrong paradigm for DOD to look forward in terms of what it has to do. We will not have four months of spring training to iron out whatever problems we discover along the way. We will not have in all likelihood a benign environment in which we can deploy our forces, marshal them and get ready to fight.

We may have to fight our way in under very hostile conditions very early. With respect to our efforts on the ground, we haven't sorted out from the ability of space assets to act as a force multiplier. We identified two things during Desert Storm. Space was an invaluable asset to us that gave us leverage that the Iraqis couldn't hope to have.

We identified that there were things we hadn't thought about in terms of fighting using space. The current space infrastructure was set up to serve primarily the strategic nuclear user, to keep an eye on what the Soviets' Navy, Army, and Air Force were doing, and provide connectivity between our national command authorities and strategic nuclear forces.

I probably can't overstate the extent to which that threat has changed. You heard Dr. Quinn's discussion with regard to Milstar. We are still making strides, but very slowly, for a variety of reasons, trying to evolve space systems built, designed, costed out and fielded to do one set of missions above all else and moving them to do a different set of missions that five years ago would have been viewed only as a secondary, if not tertiary, mission.

I personally don't like the pace at which things change in the DOD. It is the number one priority in my office. That is the integration of space forces into the U.S. military force structure so that we can fight the systems effectively so that we don't sacrifice lives needlessly. That has been made known to my management.

You are catching us at a time where we are at the front end of trying to change a policy designed during the Cold War to inform what we should do now. Meanwhile, threats change from day to night in character, and that the resources that we have to bring to bear to modify or change direction with some very costly systems are very limited and likely to be more limited in the future.

Mr. MURTHA. I appreciate that statement. It kind of reinforces what we found in Korea, the difficulty of trying to meet a threat. If the mission of the ground forces in Korea is to deter and then repel an attack, that is one thing. If the mission of the force is to destroy their nuclear capability, that is much more complicated, and then you can be assured that they will probably attack South.

We found because of the world situation a lot of consternation by the South Koreans about what we are willing and able to do and how difficult it is to destroy a nuclear capability. If they have weapons, we don't know where they are, and if we were going to destroy their capability, we would have to destroy their processing plants, and that would precipitate an attack; I don't think there is any question about that. So we have always felt that if we only had a few dollars to spend, it would be in nuclear deterrence. We felt that is absolutely a key to survival of the country.

We worry about nuclear terrorism, but we certainly have to shift faster to the possibility of a Third World nation having a nuclear weapon. They announced as we left Korea they were going to let us inspect, but now they are holding up the visas and General Shalikashvili told me this morning we cannot be assured by inspections that they don't have nuclear weapons and that safeguards are in place.

We ask you to move as quickly as possible and give us advice. We see significant changes in priority that may have to be done sooner rather than later.

I think you saw on the Floor of the House of Representatives a floor on the amount of defense spending that Members are not willing to go below. But even that is inadequate, because the acquisition savings will not be there.

We have tough decisions and don't want to be wasting money in programs now that are not going to have any use in the future. That is what we are trying to come up with.

I appreciate your statement and the problems that you are facing.

Mr. DICKS. We are also concerned here that the program may be overstated by as much as $30 billion to $50 billion; that what was inherited from the previous administration—all kinds of savings were supposed to be achieved that may not be achieved—and then you have the management achievement that this administration wants and that is factored into a budget, and if those don't occur, then you have a major gap in your five-year defense plan.

We will have to look at these issues very carefully in order to be realistic about what is achievable.

Mr. KLINGER. If I may, I guess one comment I would make is that my colleagues in the Pentagon, including those at this table, frequently roll their eyes when I walk into the room because the policy guy always shows up with a laundry list that he wants, but never brings money to pay for them.

One of the things we are trying to do working with C3I, with the Acquisition and the Reconnaissance Office and with the Unified Command is to make changes in the way we operate the forces, the way we train, equip, the way we exercise, so that we can more smartly take advantage of the capabilities that are already deployed.

The left hook in Iraq would not have been possible without the use of GPS land navigation, but we have to get the Army to begin including GPS land navigation in the basic training manuals.

There are things that are that basic that I am trying to focus on and bring as a matter of policy into the fore so that we can make space forces, if you will—no pun intended—less alien to the U.S. military. There is a large cultural change that has to happen in the DOD, much of which was catalyzed during Desert Storm, but that is an ongoing process and your experiences with the Department and the military organizations such as that change and evolve very slowly.

A lot is going on in the Department that I think will yield fairly significant dollar savings, even though invisible programmatically. My job is to make that happen in a more coherent fashion.

Mr. MURTHA. Mr. Skeen.

SINGLE-STAGE ORBIT PROGRAM

Mr. SKEEN. I would like to discuss the Single Stage To Orbit (SSTO) program that we have, which is of great interest to us in New Mexico.

What has been accomplished in that program up to this point?

General MOORMAN. The Single Stage To Orbit that I think you are speaking of is the DC–X program. We have had a series of three tests so far. The DOD has sponsored a series of tests down there to demonstrate that you can have a vertical takeoff, hover, move over, and then land. DC–X has demonstrated that you can do that with a small group of people, that you can write the associated software to do that in a relatively short period of time.

As you know, there are still tests to be done in this fiscal year and I think there are three additional tests planned. The primary test is to demonstrate the so-called pitch-over maneuver where you go to 100,000 feet, and pitch like this to land vertically. There is $5.3 million still left to be spent in support of that program.

Mr. Deutch has earmarked money for that. The study group has been asked to comment and recommend how specifically to spend the remaining SSTO money that has been authorized to ARPA in FY 94.

Mr. SKEEN. I know we appropriated $4.8 million for testing and you say that that money was spent, but we are still not finished with the tests?

General MOORMAN. There are still $5 million worth of tests to do in Phase One. Those have been earmarked in the Defense Department.

Mr. SKEEN. In fiscal year 1994, the committee added about $40 million above the budget for ARPA to begin looking for the competitive approach to this DC–X system. What is the status of that program?

General MOORMAN. That $40 million was what I was referring to. Mr. Deutch has asked our study group to focus on how best to spend that money. One of the observations our study group would make is that there is a great deal of consensus on the potential value of SSTO or reusable systems, lots of disagreements as to technical risks, schedule, et cetera. We will discuss that at some length.

Mr. SKEEN. I would like to have the conclusions.

General MOORMAN. We will probably be sending our report here in late April.

[The information follows:]

The panel found there was a general consensus on the benefits of reusability. There was, however, no consensus as to the schedule, cost, risk, and technology availability. The study recommends that DOD and NASA pursue cooperative technology maturation efforts which include experimental flight demonstrations.

Overall the study has fifteen specific findings and recommendations which will be presented in detail when the report is formally presented to Congress in the late-April time frame.

Dr. SCHNEITER. The Delta Clipper (DC–X) tests that we want to conduct to complete that part of the program don't go into space——

Mr. SKEEN. You have been working on controllability?

Dr. SCHNEITER. Yes.

Mr. SKEEN. So it will take a great deal more as far as investments in appropriations bills before you get into a space orbiting test, but up to this point, it has been a very successful program?

Dr. SCHNEITER. That is correct.

General MOORMAN. One of the things in our study that we will provide you and the rest of the Members is we also have general consensus on what are the single stage to orbit (SSTO) or reusable technological long poles, what are the things you have to put money into to have the payoff. There continues to be a variance on how long it will take you to mature that technology.

Mr. SKEEN. There is a lot of speculation about how useful this will be. There is civilian use, but what about military use?

General MOORMAN. Should you be able to produce it, scale it up, get the kind of power and structural improvements primarily on operability for space launch; such that you would be able to take off frequently, replenish constellations, launch things on need; that is the big payoff and drives down the cost per launch.

Mr. SKEEN. Any possibility of freight deliveries, load-hauling capability?

General MOORMAN. I characterize SSTO as kind of a-field-of-dreams approach to the launch business.

I don't mean to be flippant. We have done a lot of studies on the value of reusability. Six major contract houses looked at that. If you had inexpensive launch capability, what kind of industry could you stimulate? That is where the field of dreams comes in.

If you were able at some juncture, 20 or 30 years from now to be able to get your costs per launch below $1,000 a pound, you may start to stimulate a commercial industry that would move into space.

Mr. SKEEN. You have already stimulated the industry because there is fierce competition about spaceport capability in the future. It all starts with a dream of some kind or another.

General MOORMAN. I was speaking of the payload industry, tourism or waste disposal or whatever, a whole raft of things that might be considered.

Mr. SKEEN. Around White Sands, they are very much interested in infrastructure, where they fit in the picture. It is a selfish interest. I appreciate the responses.

Mr. MURTHA. Mr. Dicks.

MILSTAR PROGRAM

Mr. DICKS. Dr. Quinn, I read through your statement on Milstar. I have been a very strong supporter of Milstar over the years and I wanted to ask—about opposition in the Pentagon. We have had the problem that the Air Force didn't support the program and they wanted to have some other program, but now this has gone through the Bottom–Up Review and the administration has made a decision that it wants to go forward with six satellites. Is that correct?

Dr. QUINN. That is the current program.

Mr. DICKS. Do you think it is going to change?

Dr. QUINN. I don't think so. There are people coming out of someplace or other attacking the program, but at the moment, the six satellites are still solvent. Two are the original design satellites;

the low data rate payload that we could not modify in time to get the satellites launched and get an initial capability.

The other four will have the medium data rate payload that will give the satellite a wider capability for tactical users.

Mr. DICKS. The high data rate would be part of the new program?

Dr. QUINN. Yes.

Mr. DICKS. Milstar has been attacked as a relic of the Cold War and that it has all kinds of capabilities that are no longer necessary. How do you respond to that? As I recall, three years ago we restructured this program, tried to give it more military capability.

Have we been successful in that? I understand that the costs has been reduced because of those changes.

Dr. QUINN. It has. On some of the earlier designs, there were heroic capabilities of the satellite in terms of survivability, and most of that has been removed. The basic survivability of the satellite is in the electronic arena in that it can survive any kind of antijamming attack and it has a low probability of intercept. Much of that original survivability design has been removed and the costs of the satellite significantly reduced from what it was in the original program.

Mr. DICKS. Some people have suggested ending at two satellites. Then we would have a serious gap in time until we would get to—a follow-on new satellite, whatever it is. Is that correct?

Dr. QUINN. Yes.

Mr. DICKS. What would be that gap in time?

Dr. QUINN. Six to eight years.

Mr. DICKS. There is savings, but also an enormous risk, which I assume was considered when you did the Bottom–Up Review, and the bottom line was service unacceptable. We have to go forward with the first six satellites to have this medium data rate/EHF capability and then at that point restructure and come up with a new follow-on satellite that can be on a launched on something other than the TITAN IV; is that correct?

Dr. QUINN. That is the current plan. It would not make sense to put a capability there and have it for a few years and then turn it off when the military people depend upon it and the kinds of solutions it would provide to military effectiveness would be there for a short time and then removed for six years.

Mr. DICKS. In the Gulf War, is it true one of the major deficiencies was in secure, mobile communications?

Dr. QUINN. Yes. This is why the CINCs that would have to use it are in support of it and say it does solve some of those key problems.

Mr. DICKS. The CINCs, the war fighters, the Army and the Navy have strongly supported this program?

Dr. QUINN. Yes, sir.

Mr. DICKS. Air Force opposition is they thought this was funded out of their budget and they would rather spend the money on other things?

Dr. QUINN. Yes.

Mr. DICKS. In your personal judgment, Milstar is still a high priority that we ought to keep in this budget?

Dr. QUINN. Yes, sir.

Mr. DICKS. Thank you, Mr. Chairman.

Mr. MURTHA. Thank you very much. There will be additional questions for the record. The Committee will adjourn until 1:30 p.m. Tuesday.

[CLERK'S NOTE.—Questions submitted by Mr. Dicks and the answers thereto follow:]

DEFENSE SUPPORT PROGRAM

Question. During a recent trip to Korea, the issue was raised regarding the lack of theater capabilities. Are our present warning assets capable of handling the two Major Regional Conflicts?

Answer. Our present assets are capable of meeting the requirement of two Major Regional Conflicts with some limitations. The current ——— satellite constellation, while sufficient in size, ———.

Question. What is the health of the current DSP system?

Answer. DSP currently has ——— and the eventual operations of theater systems such as ALERT later this year.

Question. Do you support the Department's plan to terminate additional DSP satellites?

Answer. Yes. We have conducted thorough evaluations of our need for DSP satellites given the development of a more capable system (ALARM). Our analysis shows that, with minimum risk, the currently developed DSP satellites (numbers 17 through 22) and the addition of DSP satellite 23 provide us with sufficient satellites to maintain the needed constellation to continue our current capability until ALARM is deployed. However, to provide the required detection of theater level missiles we need to deploy the improved sensor to be provided by ALARM.

Question. OSD has indicated it would like to conduct a technology demonstration which might significantly lower the cost of the new "ALARM" program and provide some early theater operational capability. Do you plan to put the demonstration on a DSP?

Answer. At this time it is too early to determine if DSP will be the host platform. DSP, along with other platforms will be considered. The host for the technology demonstration depends which technical proposal selected to achieve the stated objectives and requirements. Factors that will influence the determination of the host platform include, but are not limited to, the following: (1) the impact on the host platforms primary mission(s), (2) the weight, power, and size of the technology demonstration and the capability of host platforms to handle these additional loads, (3) the downlink requirements of the demonstration and the excess downlink capacity available on the host, (4) the commanding requirements of the technology demonstration, and (5) the additional hardware and software or other modifications that may be required to process and analyze the data.

Question. How are you going to ensure that we maximize the operational value from the technology demonstration?

Answer. The technology demonstration is being pursued to develop information on infrared phenomenology as well as to determine if a new sensor system can ultimately reduce the life cycle of costs of an improved ALARM system. As such, the results of the technology demonstration should highly leverage the ALARM acquisition system. At the same time the technology demonstration may well provide some operational capability. This capability will, of course, be maximized to provide support to the operational commands.

Question. What are the requirements of the proposed new system, the costs, and when will it be operational? Has the department performed the usual DAB to validate these costs and schedules?

Answer. The long term requirements (objectives) for the ALARM system will be based on the currently validated requirements for missile early warning. These requirements will be achieved through Preplanned, Product and Process Improvement (P31). The initial block of ALARM satellites will meet a set of threshold requirements. In general, the threshold requirements are centered around the need to provide continued strategic missile detection with improved detection of theater events in limited areas of concern. The projected cost for the ALARM system through 2006 is $7B. This includes funds to support the improvement of the DSP ground segment to support DSP to ALARM transition and to be the ALARM ground segment. The first satellite is scheduled to be delivered in CY 2004 with additional deliveries at one year intervals until the required constellation is reached. It should be noted that, during the transition, both DSP and ALARM satellites will be used together to provide needed coverage. The previous FEWS DAB and last years detailed reviews give us confidence that the costs and schedule for the ALARM system are reasonable and low risk. In addition, a DAB Program Review is scheduled for October 94 to validate the acquisition strategy for the ALARM system.

Question. What is the fall-back if the proposed new system is not operational on the scheduled date?

Answer. With the amount of past technical evaluation and system review, we are confident the ALARM system is technically low risk and will be available on schedule. Additionally, our analysis of the DSP projected launch schedule and expected satellite lifetimes indicate that we will be able to maintain a minimum DSP constellation through the ———. This provides some fall-back capability in the unlikely event that the ALARM system is not available in 2004. With our plan to operate a mixed DSP/ALARM constellation during transition, we should have little difficulty in maintaining needed capability.

Question. In Undersecretary Deutch's letter to the Committees, he stated that our current DSP satellites could be stretched to last longer than originally thought. Can you tell us what your plans are for maintaining a healthy constellation?

Answer. Based on reevaluation of the Mean Mission Duration (MMD) the current generation of satellites should last approximately ——— years, with this mission model it is possible to launch DSP satellites on ——— month centers versus ——— month centers and therefore more effectively manage this constellation through———.

Question. Now that you have decided to keep DSP #23, terminate FEWS, and start a follow-on system, where or how will Brilliant Eyes fit into the architecture?

Answer. The ALARM system will provide worldwide surveillance of missile launches. It provides detection and tracking of missiles in the boost phase. After booster burnout, ALARM is no longer able to track the missile. To provide tracking of missile warheads, we currently use ground based radars. However, these systems have limited coverage and primarily only support detection of missiles launched toward the continental US. This is where a system such as Brilliant Eyes (BE) comes into play. BE, in its missile defense role, has sensors designed to track missiles from booster burnout through warhead deployment to re-entry. While BE provides boost detection in limited areas of interest, it requires a cueing system, such as ALARM, to provide detection and tracking of missiles outside of its surveillance areas. When used together, ALARM and BE provide detailed and continuous information on missile launches to support military and presidential decision making. Additionally, BE provides detail warhead tracking information and cueing to increase the effectiveness of ballistic missile defense systems.

MILSTAR SYSTEM

Question. The first Milstar was recently launched. The plan is to launch a second Milstar with the low data rate, to be followed by four more satellites with the medium data rate capabilities. How important is this program to our military?

Answer. Milstar is very important to our military. It is the only system that can provide completely secure, encrypted, anti-jam, and low probability of intercept, communications to our warfighters. Although the DOD is transitioning to maximum amount of its general purpose communications to commercial systems, its hard core comm requirements still have to be satisfied—and Milstar is the only system we have to meet those protected, secure, and assured comm requirements, Milstar II takes advantage of the Milstar I investment, and gives us a faster, medium data rate capability that can be better exploited by our tactical warfighters.

Question. How is the development testing going on the first satellite?

Answer. The testing is proceeding right on schedule, with only a small number of discrepancies found to date, as is the case on any developmental spacecraft. The most serious of these was a power converter failure. We are currently operating on the redundant side of the power converter. This power converter is used extensively on the spacecraft and therefore underwent considerable qualification testing. In addition, this specific part underwent 5,000 hours of testing. Based upon this testing result and our analysis subsequent to the failure, we believe this is a random failure.

Question. The ground terminals, such as SMART–T will have both low (LDR) and medium data rate (MDR) capabilities. Given the fact that it will have up to 32 channels with the MDR, I would anticipate the users would choose to use the MDR—which could be a problem for the airborne command posts because they don't have the interoperability capability at the MDR—they currently only have the 4 channels at LDR. What plans does the Air Force have for the airborne platforms to ensure interoperability with the Army and the Navy in both low data rate and medium rate modes?

Answer. The Air Force currently does not have a validated requirement for medium data rate (MDR) on its airborne platforms. This means there would not be interoperability with the Army and Navy at MDR data rates (interoperability will still exist with the SMART–T LDR and other NAVY/Air Force LDR terminals). Should MDR become a requirement for airborne platforms, there are several possible solutions. An MDR applique could be added to the command post Milstar terminal currently being fielded (the Navy's plan) or MDR capability could be integrated into the Low Cost Terminal (LCT) without an increase in size. The LCT is not currently being programmed for production.

Question. Now that the bomber fleet will be used to support tactical requirements, do you have any plans to revisit the need for survivable, anti-jam communications for the purposes of retargeting cruise missiles and smart munitions?

Answer. At the Oct 92 DAB, the Air Force deferred all airborne EHF requirements that necessitated the development and production of the LCT for platforms such as the bomber fleet. Subsequently, the Air Force directed termination of the LCT development activities at the completion of phase I. All activities have ceased and the contracts are in closure. Additionally, the Senate Appropriations Committee denied funding requested for the LCT during the 1994 budget hearings and restricted any additional efforts to continue work without committee approval. No additional effort can be extended on the LCT program beyond the completion of the demonstration effort originally begun in 1992 without validated Air Force requirements and relaxation of congressional direction.

Question. The airborne intelligence platforms such as J–STARS, AWACS and others use ultra high frequency (UHF) satellite communication links—which are easily susceptible to jamming. In addition, they do not allow for direct, real time, platform to platform connectivity at higher rates. Would it not be appropriate to use Milstar's medium data rate capability with the new low cost terminal architecture to alleviate this shortcoming?

Answer. It would be very appropriate to use the LCT to alleviate the Air Force's airborne MDR as well as UHF satellite communications shortcomings. With the current LCT hardware, it is possible to support anti-jam LDR communications and an upgrade to accommodate MDR communications. It can be added without an increase in terminal size. Such a capability would allow the platform to platform connectivity. As a result of the program termination and the restriction to continue any development effort on the LCT program, there is no current airborne terminal solution that can meet the EHF MDR requirements of these platforms.

[CLERK'S NOTE.—End of questions submitted by Mr. Dicks. Questions submitted by Mr. Dixon and the answers thereto follow:]

DEFENSE SUPPORT PROGRAM

Question. Last month, Secretary Deutch stated that our current DSP satellites could be stretched to last longer than originally thought. Would you please tell us what your plans are for maintaining a healthy constellation. Also, I realize current DSP's are launched primarily on Titan IV vehicles, but since the last launch was on the space shuttle, have you considered using additional shuttle launches to assure a healthy DSP constellation?

Answer. We are planning to launch DSP 17 this fall, barring further Titan IV program problems. DSP 18 will follow DSP 17 by approximately 1 year. Further launch schedule decisions for satellites 18 through 23 will be made by CINCSPACE based on the health of the constellation. At this time, we do not intend to launch any future DSP satellites on the space shuttle due to cost considerations.

Question. The Office of the Secretary has indicated that it would like to conduct a technology demonstration which might significantly lower the cost of the ALARM program and provide some early theater operational capability. I strongly support this initiative and believe we should move quickly. Initially, we were told the demonstration would be on a DSP. Is this still the case? If not, why have you changed? How are you going to ensure that we maximize the operational value from the technology demonstration?

Answer. DSP was used as an example of how a technology demonstration could be hosted, however, we have not selected the method to best implement the demonstration. It was always our intent to most cost-effectively implement the demonstration. For example, the demonstration could be hosted on several existing platforms or could be a free-flying satellite, launched from the space shuttle or other booster. The Tech Demo will use the draft ALARM Operational Requirements Document as the reference for the Tech Demo program, but we will not impose the operational or test requirements for ALARM onto the Tech Demo—that would negate the reason for pursuing the Tech Demo.

Question. I understand that Armed Services Chairman Ronald Dellums recently wrote to you requesting that you maintain an option to procure DSP satellite 24 until Congress has reached a decision on the new ALARM Program. Given the importance of maintaining adequate missile warning, it is imperative that we are adequately covered until the ALARM system becomes operational. It is also important that we take the time to clearly define the ALARM system and obtain a consensus on its requirements. We have had too many stops and starts in the surveillance area and we should agree on where we are going before we start out. What are your plans?

Answer. There are 7 DSP satellites available to fill the 10 years between now and ALARM's first delivery in 2004. DSP 17–23 will meet our early warning needs until ALARM is available for launch. Based on longer life and slower launch schedule for the DSP satellites, we have determined we would not launch DSP satellite 24 or 25 prior to the scheduled delivery date of ALARM. We are in the process of drafting the requirements for ALARM. These requirements are being formulated with the full participation of all DoD parties interested in space-based missile detection and technical intelligence. The requirements for ALARM will receive Joint Requirements Oversight Committee approval prior to a Defense Acquisition Board Program Review currently scheduled for fall 1994.

[CLERK'S NOTE.—End of questions submitted by Mr. Dixon.]

[Questions submitted by Mr. Darden follow:]

Question. You have stated on previous occasions that you do not need, nor support, the procurement of DSP satellite 23, and the money was better spent in pursuing a replacement system. Accordingly, do you see any reason at all to even consider the purchase of additional DSP's such as numbers 24 & 25?

Answer. No, we see no reason to buy DSP 24 or 25.

Question. Are there other DSP satellites in storage and, if so, are those numbers sufficient to fill the time between now and when a new replacement system would be available?

Answer. There are 7 DSP satellites available to fill the 10 years between now and ALARM's first delivery in 2004. DSP 17–23 will meet our early warning needs until ALARM is available for launch. Based on longer life and slower launch schedule of the DSP satellites, we have determined that we would not launch DSP satellite 24 or 25 prior to the scheduled delivery date of ALARM. We used the typical GAP procurement models to predict when we would need to buy ALARM satellites. This model predicts with 90% confidence we will not need DSP 24 or 25, and these models are very conservative. Both Air Force and Unified Space Command experts concurred with this prediction prior to our decision to buy only DSP satellite 23. We view DSP 23 as the "gap insurance" we need to bridge the gap between ALARM and DSP.

Question. If a SCUD missile was launched by North Korea today, are you assured that the DSP could detect the launch in time to provide warning to our troops?

Answer. No, DSP performance over Korea is limited for the following reasons: Weather. The weather in Korea is predominately cloudy. Clouds obscure the detection capability of DSP. The Threat. According to Intelligence estimates, the North Koreans have ———. For example the missile does not "burn" or emit Infrared (IR) long enough to allow ——— enough time to formulate an accurate report, if able to report at all due to DSP's design limitations. DSP Limitations. ———.

Question. Since the new ALARM system is supposed to be focused on providing launch detection and tracking of SCUD type missiles for theater warning, shouldn't we get on with procuring ALARM as soon as possible?

Answer. Yes, we are postured to begin ALARM acquisition early in FY 1995 as soon as funds are appropriated for the ALARM system.

Question. After investing over $2 billion in new missile warning technologies associated with the FEWS program, why are we spending more monies on DSP experiments instead of using those funds to accelerate the new ALARM program?

Answer. We are not proposing any "DSP experiments." We have proposed to fund a Technology Demonstration to explore other phenomenologies and lower life cycle cost options for ALARM. Based on our investment in FEWS, we have high confidence industry can build a three axis stabilized, Mercury Cadmium Telluride, MLV class early warning satellite for the costs and schedules we have provided. The Tech Demo is attempting to push technology, searching for concepts that may significantly lower the life cycle costs of ALARM while meeting the objective requirements through P3I.

This is where the Tech Demo pays off. For 1% of the life cycle cost of the ALARM system, the government takes the risk and funds one or more promising concepts that may save scarce resources over the life cycle of ALARM. We have already received several novel concepts from industry that may be worth pursuing, several potentially low cost (e.g., multispectral, advanced MWIR, multiple sensors per platform, small satellites approaches, etc.).

While planning is underway, it is likely the Tech Demo will: emphasize fast schedule and low cost; contribute to ALARM design or P3I upgrades; be flexible in implementation; free flyers on shuttle, Pegasus, etc.; be hosted on other larger satellite platforms; and not be restricted to DSP–19.

We have budgeted $31 million in FY 1995, and $101 million from FY 1996–99 to complete the Tech Demo. To appreciably accelerate ALARM, we would need to start the EMD phase earlier. The majority of the Tech Demo funds are in FY 1995 and FY 1996 when we are still in the Dem/Val phase. Adding $132 million in FY 1995–99 to the $1 billion ALARM investment will result in only a slight acceleration to the ALARM schedule.

Question. Last year in testimony you said that the FEWS was your number one priority program and absolutely necessary for you to successfully carry out your theater warning mission. The Defense Department recently decided not to go forward with FEWS. To what degree were you consulted in this decision?

Answer. While the FEWS program was technically sound and did meet our theater warning requirements, fiscal realities forced the corporate Defense Department to make the difficult decision to cancel FEWS. The Air Force (AF), included AF Space Command, and all relevant offices within OSD had an input and were consulted prior to the decision.

[CLERK'S NOTE.—End of questions submitted by Mr. Darden.

Questions submitted for the record and the answers thereto follow:]

SPACE POLICY AND MANAGEMENT

Question. Last September, the Committee asked that proposals for certain space-related organizational and policy changes be submitted with the fiscal year 1995 budget so that they could be discussed in the hearing. On March 14—three days ago—OSD sent a letter saying the requested report would not be available until August. Why will it take so long to provide any response?

Answer. The Under Secretary of Defense (Policy) and the Under Secretary of Defense (Acquisition and Technology) are jointly leading a Department-wide review, as co-chairs of a Steering Group, to address the space organization and management concerns in the report language. The requested report will not be available until August because of the complexity of the issues which must be addressed and the relationship of those issues to other studies the Department has underway, including the review of the Commission on Roles and Missions and the Intelligence Bottom-Up-Review.

Question. The proposals that the Committee requested from DOD included centralizing space funding, standardizing payloads on common satellite buses, and assigning responsibility for coordinating space programs in a single OSD office. Has anything at all been accomplished?

Answer. The Secretary of Defense and the Deputy Secretary of Defense have not made any decisions concerning the Committee's proposals. They will evaluate the results of the Department-wide review of space organization and management after it has been coordinated within DoD and approved by the co-chairs of the Steering Group.

Question. At last year's hearing, it seemed clear that no one was in charge of space programs. Yet there specific offices in OSD which are assigned management and policy responsibility for such programs as manpower, logistics, health care and communications. Has any OSD office yet been given responsibility for coordinating space policy?

Answer. The Office of the Assistant Secretary of Defense for International Security Policy (OASD/ISP) is responsible for providing the principal staff assistance and advice to the Secretary of Defense, the Deputy Secretary of Defense, and the Under Secretary of Defense for Policy on policy and strategy for space systems. In this capacity, OASD(ISP) is responsible for developing, coordinating, and overseeing implementation of DoD space policy, as well as reviewing and evaluating programs, plans, and system requirements relating to the use of space. In addition, the Office of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (OASD/C3I) is responsible for providing principal staff assistance and advice to the Secretary and Deputy Secretary for C3I, including warning, reconnaissance, and intelligence and intelligence-related activities conducted by the Department of Defense. In this capacity, OASD(C3I) is responsible for establishing policy and providing direction of DoD Components, inter alia, on C3I related space systems; telecommunications; identification, navigation, and position fixing systems; surveillance, warning, and reconnaissance architectures; intelligence programs, systems, and equipment; radio frequency policy and management; mapping, charting, and geodesy; and integration and/or interface of national and tactical C3I systems and programs.

Question. What OSD office has the authority to make decisions when there are space-related tradeoffs such as payload requirements versus launch vehicle costs, maintaining old equipment versus new acquisition, or R&D funding versus ground infrastructure improvements?

Answer. The decisions are addressed within the Department's program and budget review cycle for those national security space capabilities which are funded by DoD. Issues which arise during the program and budget review cycle are adjudicated by the Defense Resources Board, chaired by the Deputy Secretary of Defense, which develops final recommendations for approval by the Secretary of Defense.

INDUSTRIAL BASE

Question. What are the areas of concern with regard to industrial base for space-related programs?

Answer. The Department of Defense has initiated a top-down approach for each defense sector to evaluate the defense industrial base for selected areas. Space launch has been chosen as one of those areas. This effort will include prime contractors, major subcontractors, sub-tier suppliers, and component manufacturers.

Areas of concern deal with how we maintain a core capability in a shrinking supplier base, especially at the sub-contractor and subtier levels. Specific efforts are underway to address the following: (1) Assessing whether the emerging business base can support existing U.S. launch vehicle prime contractors; (2) assessing the nature and seriousness of foreign competition facing the U.S. launch vehicle industry; (3) identifying current impediments to maintaining a viable and technologically innovative U.S. launch vehicle industry; (4) characterizing a "right-size" and efficiently structured industry; and (5) proposing policies that can strengthen the U.S. launch vehicle industry.

Question. Items like tanks, submarines, and stealth aircraft have no commercial market outside of perhaps a few foreign military sales. However, there is clearly a civilian commercial market for launch vehicles, and some satellites. a. Will the civilian market provide enough demand to keep critical production capabilities alive? b. Is commercial investment likely to provide sufficient funding for research and development or will DoD have to keep R&D funding lines going to spur technological innovation?

Answer. a. We do not believe that the civilian commercial market will provide enough demand to keep critical production capabilities alive. This is a result of the limited opportunities for the U.S. launch industry to compete in the international market and the small number of non-government satellites for launch. b. The likelihood of significant commercial investment for R&D is small without major investment from the government or a firm commitment to purchase a sufficient number of launches to enable an investor to recover his up-front costs in a reasonable period of time (less than 5–7 years). Based on discussions with the industry, it seems that they would look to the DoD or some other government organization to make the major R&D investments associated with technology innovation.

GROUND INFRASTRUCTURE

Question. Because of the aging ground infrastructure, DOD space launch ranges and satellite tracking operations are relatively inefficient. Last year the Air Force estimated the modernization costs to be approximately $1 billion. How much is included in fiscal year 1995 for this modernization effort?

Answer. $128 million in fiscal year 1995 procurement and RDT&E funds have been requested for RSA. $954 million is the current estimate through fiscal year 2003 for the Range Standardization and Automation Program (RSA). RSA will modernize range infrastructure at both the Eastern and Western Ranges. (Note: RSA addresses only the modernization of the range infrastructure, i.e., telemetry, tracking, and command systems. It does not include range sustainment funds, which are also funded from the range program elements, or other space launch infrastructure such as roads, base support facilities, launch vehicle specific projects or Air Force Satellite Control Network upgrades.)

Question. Is this amount sufficient to ensure that you continue an aggressive program to work off the backlog of improvements that are required?

Answer. The $128 million budgeted for fiscal year 1995 is sufficient to accomplish planned 1995 range modernization efforts, assuming planned sustaining I&M funds are also provided. This is part of the overall plan to incrementally modernize both the Eastern and Western Ranges, with the Eastern Range to be completed in 1999 and the Western Range in 2003.

Question. For the record, please give us a list of the specific improvements that you plan each year, including the dollar amounts, for fiscal year 1995 and each year of the outyears.

Answer. The attached table includes a list of the improvements planned for each year through fiscal year 1999 for the total Program Element. Detailed programming is currently underway as part of the fiscal year 1996 POM process. All of the improvements can be grouped into two general categories: Range Standardization and Automation (RSA), and sustaining Improvement and Modernization (I&M). RSA will modernize the range infrastructure at both the Eastern and Western Ranges using a systems approach to replace obsolete and unsupportable systems and components with standard, reliable and maintainable systems. The I&M program will sustain existing equipment until it can be replaced by RSA, or ensure long term viability as it is incorporated into the RSA architecture. (All figures are $ million.)

	Fiscal year—				
	1995	1996	1997	1998	1999
RSA—System design	17.0	29.9	2.1	1.8	1.2
RSA—Phase 1 contract (Modernizes Antigua and Ascension, Cape Canaveral AFS communications, and telemetry processing at both ranges)	40.8	22.5	14.3	10.5	7.4
RSA—Phase 2 contract:					
GPS tracking	....	5.8	3.8	....	....
Multiple object tracking radar upgrades	5.0	0.3	....	....	....
Launch head/midrange telemetry, tracking & command (including mobiles)	21.0	14.1	25.3	24.8	7.7
Air route surveillance radar installation	....	4.6	....	....	....
WR comm systems modernization	21.0	12.4	11.6	19.4	12.7
Control & display modernization	....	....	37.0	26.0	19.3
RSA—Range I&M Program management	11.2	10.5	10.2	11.7	3.6
RSA—Range operations control center (ROCC) engineering services	11.9	....	....	....	....
Sustaining improvement & modernization (I&M)	31.3	66.8	67.5	77.3	87.4
Total	159.3	166.9	171.7	171.5	139.3

WEATHER SATELLITES

Question. Several Congressional Committees—including this one—last year directed the DOD to work with the Department of Commerce to merge the separate weather satellite programs. What has been done to meet this Congressional mandate?

Answer. The DOD has been actively involved with the DOC (through NOAA) and NASA to develop a strategy on how to transition to a converged civil/military weather satellite program. During the summer of 1993, the tri-agencies formed teams to study key policy, architecture, and management issues associated with a converged program. In January 94, the tri-agencies documented their results and provided recommendations to the Office of Science and Technology Policy (OSTP) for inclusion in an OSTP Convergence implementation Plan due to Congress by 30 Apr 94. The DOD continues to work with OSTP and the other agencies to complete the Implementation Plan and will fully support the transition to a converged program.

Question. Will there be any adverse impact to the users of either military or civilian weather data from such a consolidated effort?

Answer. No adverse impacts are expected by either the military or civilian communities. The DOC (through NOAA) and the DOD have already begun to review, consolidate, and prioritize civil and military environmental sensing data requirements. These requirements will be documented in a joint-agency requirements document which will be used to drive the acquisition of a converged system. Trade studies are being conducted by the DOC and DOD to determine the most cost and operationally effective solutions to the requirements. These trade studies will continue through FY95.

Question. This Committee told DOD that no funds would be provided to begin a new generation of weather satellites that were not a part of such a consolidated effort. Are any funds requested in fiscal year 1995 for a new weather satellite program?

Answer. No. The Air Force has requested $7.6M in FY95 RDT&E funds to complete joint-agency trade studies of a converged DOD/DOC operational weather satellite system. The funds will also be used to prepare for a joint-agency review in FY95. The DOD has ceased independent DMSP Block 6 efforts and has separated the funds into a new Program Element (RPE#0603434F) to prepare for convergence. Although the new PE is entitled "DMSP Block 6," the DOD, in coordination with the DOC, will only use the FY95 funds to support convergence-related efforts.

MOORMAN SPACE LAUNCH REVIEW

Question. When you finish briefing your study findings to senior DOD officials, do you expect specific recommendations to follow that may have some impact on the fiscal year 1995 budget request?

Anser. There are three specific findings and recommendations in the executive summary with potential impact on the FY 95 budget request.

SINGLE STAGE TO ORBIT

Question. The DC–X was only a scale model and did not have enough power to reach orbit. It is the committee's understanding that a full-scale orbital vehicle would require the invention of new technologies for both the materials the launch vehicle is made from as well as the rocket engines themselves. (a) Do we have the technologies we need to build an SSTO vehicle? (b) Do you have an estimate of what it might cost and how long it might take to develop such a vehicle? (c) Some press reports speculate that an SSTO vehicle could be operational in 5 years for less than $10 billion. Is that possible?

Answer. (a) We believe that we have a good understanding of the technologies required for a SSTO vehicle and that there would be minimal technology "invention." What's required is a period of time to mature and demonstrate these technologies so that we could minimize the risk of developing a full-scale orbital SSTO vehicle. Some examples of these technologies include: cryogenic tanks, composite airframe structures, thermal protection systems, propulsion, and integration into a lightweight, reliable, and operable flight vehicle. It is envisioned that the period of maturity would run through the decade. (b) The Department and industry, as well as NASA, have estimated the cost to develop a SSTO vehicle. There is a wide disparity between the government estimates and within industry itself. These estimates range from $5–$20 billion. The rationale for the technology maturation and demonstration effort is to better define these costs. (c) Although some cost estimates and schedule projections are within this range, such a program would be risky given the lack of maturity of certain of the technologies required and the design of such a vehicle. To develop a flight demonstration vehicle that would be less than full-scale and would not reach orbit, but would demonstrate the necessary technologies, would require on the order of $1 billion through the decade.

TITAN IV

Question. Although the Titan IV rocket launches the largest and most valuable satellites, it is very expensive and takes a long time between launches to get ready. Each Titan IV launch currently costs around $350 million—not including the cost of the satellite. A launch vehicle is essential a space-bound cargo-carrying truck for satellites. Why is the Titan IV so expensive?

Answer. There are a number of factors that result in high costs for Titan IV. To start, it is worthwhile to review the analogy of Titan IV to a "cargo-carrying truck." The analogy is reasonably consistent with our ultimate vision for space launch vehicles—our goal, if you will. The analogy is not as accurate a reflection of the current reality. In the case where we rent a truck from a commercial company, we have the choice of several standard types and sizes of trucks. It's then our responsibility to make our "cargo" fit into the truck we rent. That's not the case for Titan IV. Many of the satellites we launch on Titan IV were originally designed for launch on the shuttle. After the Challenger disaster, we shifted them over to Titan IV. Our problem is rooted in the fact that satellite designs were settled before we shifted them to Titan IV. As a result, we couldn't require the satellites to adapt their designs to Titan IV. Instead, Titan IV had to adapt to the unique requirements of each satellite. This would be like going to a commercial truck rental company and asking for a custom-made truck each time we wanted to haul our cargo. That would drive the costs of the truck rental very high, and that's effectively what's happened with Titan IV. We should note, however, that it's still more cost-effective to have Titan IV adapt to the satellite rather than to require significant modifications to the satellite.

The changes in our long term launch requirements have aggravated Titan costs. Between 1988 and 1990, we projected requirements for up to 10 Titan IV launches per year by the mid-1990s.

We designed the Titan IV program accordingly to include production and launch support infrastructure for the high launch rate. Due to cancellations and reductions in satellite programs, the projected launch rates are now much lower. We expect an average of four or five launches over the next few years. Past the turn of the century, requirements could go below two launches per year. That means the cost of the infrastructure is now spread over fewer launches, which increases the cost per launch.

Question. As the number of payloads requiring the Titan IV declines over the next ten years, the costs will increase further. Some DOD officials have speculated that a single Titan IV launch vehicle could cost as much as $750 million to $1 billion—not including the satellite—by the year 2005. Is that possible? Could DOD either develop a cheaper launch vehicle or design satellites differently so that they can fit on smaller launch vehicles?

Answer. The current Titan IV Selected Acquisition Report (SAR) shows that Titan IV launch costs—that is, launch vehicle plus "pro-rata" allocation of basic infrastructure costs—could be between $750 million and $1 billion per launch by around 2010. The SAR projection assumes we launch two Titan IVs per year past 2005 but we maintain the current Titan infrastructure—which was designed to support up to 10 launches per year—indefinitely. Changing the Titan IV infrastructure to support lower launch rates may require near-term investment but it offers the potential to significantly reduce future launch costs.

The Space Launch Road Map Study which Gen. Moorman is conducting for the Department of Defense is reviewing the opportunities and requirements for improving our space launch capabilities. The study will consider options for developing a cheaper launch vehicle as well as options to improve the performance of existing systems. As far as satellites are concerned, the DOD has already planned to make future satellites smaller so they can launch on smaller vehicles. However, there are some satellites which cannot be made small enough—as a result, we cannot eliminate the requirements for a heavy-lift launch capability. Titan IV is currently the only system we have to meet DOD heavy-lift launch requirements. Paradoxically, reducing the size of satellites when possible reduces launch costs for those satellites but actually increases Titan IV costs for the remaining large satellites. Rather than focusing on the costs to specific programs, we are attempting to focus on total launch costs to the Nation. In some cases, it may actually be more cost-effective for the Nation to fly additional satellites on Titan IV because it would reduce the unit costs for Titan IV to all users.

DEFENSE SUPPORT PROGRAM

Question. For many years, the Defense Support Program satellites have been the backbone of our space-based system for the early warning of hostile missile launches. On February 28, the Under Secretary of Defense notified the Congress he planned to stop work of DSP satellites 24 and 25, but continue work on satellite 23. With the revisions in the DPS program, will there be any impact on the schedule and cost of DSP 23? With the revisions in the DPS program, will there be any impact on the schedule and cost of DSP 23?

Answer. No, the cost and schedule of SSP satellite 23 has not changed.

Question. After much deliberation, the fiscal year 1995 appropriations conference stated there was no requirement of DSP 25 and specifically stipulate that no funds were available to DOD for DSP 25. Has DSP been officially terminated?

Answer. Yes, DSP 25 was canceled on 11 March 1994.

Question. There seems to be consensus that DSP 23 is required and DSP 25 is not. The difficult decision is what is to be done with DSP 24?

Why does DOD plan to terminate number 24?

Answer. Based on longer life and slower launch schedule of the DSP satellites, we have determined we would not launch DSP satellite 24 prior to the scheduled delivery date of the Alert, Locate and Report Missiles (ALARM) system.

Question. How confident are you that DSP 24 will not be needed while you build the new ALARM system?

Answer. We are highly confident that DSP 24 will not be needed. We used the typical Generalized Availability Program (GAP) procurement models to predict when we would need to buy ALARM satellites. This model predicts with 90% confidence we will not need DSP 24, and these models are very conservative. Both Air Force and Unified Space Command experts, concurred with this prediction prior to our decision to buy only DSP satellite 23, We view DSP 23 as the "gap insurance" we need to bridge the gap between ALARM and DSP.

Question. How much will be saved from termination of DSP 24?

Answer. The termination of satellite 24 allows us to avoid these expenses:

Fiscal year:	*In millions*
1994	23.15
1995	135.10
1996	97.00
Total	255.25

The above estimate is based on the original multiyear purchase. It does not include additional savings due to not buying another Titan IV launch vehicle or Inertial Upper State (IUS). It also assumes that we cancel DSP 24 not later than 6 May 1994.

ALARM SATELLITE SYSTEM

Question. In February 28 letter from the DOD Under Secretary for Acquisition, the Congress was notified that DOD plans to terminate FEWS and DSP, and start a new program called ALARM in fiscal year 1995. Specifically what capabilities will ALARM have that DSP does not have?

Answer. The key capability ALARM will have over DSP is the ability to detect and provide warning for tactical ballistic missiles such as the ———. Although DSP performed better than expected during Desert Storm, DSP satellites———.

Question. What is the difference in capability between ALARM and FEWS?

Answer. FEWS was required to detect and track SCUD class tactical ballistic missiles on a worldwide basis. ALARM will have this capability within two Major Regional Contingencies (MRC) areas. FEWS was required to haled 175 areas of interest simultaneously; up to a 20% of the earth's surface, while ALARM will be able to handle 2 areas of interest simultaneously. FEWS was planned to have on-board processing and cross-links allowing each satellite to operate fairly independent of ground stations, directly broadcasting processed messages to users. ALARM will not have on-board processing or cross-links resulting in satellite cost reduction. FEWS envisioned a separate ground system, while ALARM will rely on the DSP ground architecture evolved from the current system.

Question. When will the first ALARM satellite be delivered?

Answer. The first satellite will be delivered in January 2004. The earliest we can launch the Satellite is approximately 90 days following delivery. The specific launch date will depend on the status of the DSP constellation in 2004, and how many, DSP satellites remain at that time.

Question. What will be the total cost to develop the new ALARM system and how much is being requested in the fiscal 1995 budget?

Answer. We are requesting $150 million in the FY 1995 budget. We are still refining the Life Cycle Cost (LCC) estimate of the ALARM program.

Assuming ALARM costs through 2018, two Preplanned Product Improvement (P31) programs between each Block of 4 ALARM satellites, and FEWS costs through 2015, including launch vehicle costs; we have developed the following cost comparison:

[In billions of dollars]

Program	Cost 1995—2006	Estimated LCC
ALARM	7.0	11.4
FEWS	11.8	13.6

Question. What are the major milestones for the ALARM development and acquisition program?

Answer. We plan to award up to two Dem/Val contracts in February 1995 and the Commerce Business Daily announcement will be in spring 1994, the Engineering Manufacturing Development (EMD) contract will be awarded in FY 1998, and the first satellite delivery will be in 2004.

TECHNOLOGY DEMONSTRATION PROGRAM

Question. In addition to starting the ALARM program, DOD has notified the Committee that it intends to start a separate Technology Demonstration Program in fiscal year 1995. The total cost is reported to be around $150 million being requested in fiscal year 1995. What exactly will be accomplished during this demonstration project?

Answer. Based on our investment in FEWS, we have high confidence that industry can build a three axis stabilized, Mercury Cadmium Telluride, MLV class early warning satellite for the costs and schedules we have provided. The Technology Demonstration Program (Tech Demo) is attempting to push technology, searching for concepts that may significantly lower the life cycle costs of ALARM while meeting the objective requirements through P31.

This is where the Tech Demo pays off. For 1% of the life cycle cost of the Alarm system, the government takes the risk and funds one or more promising concepts that may save scarce resources over the life cycle of ALARM. We have already received several novel concepts from industry that may be worth pursuing, several as potential low cost (e.g., multispectral, advance Medium Wave infrared (MWIR), multiple sensors per platform, small satellites approaches, etc.). The Tech Demo contract(s) are not part of Dem/Val contracts, but accomplished in parellel. The Tech Demo will influence the ALARM program via:

Phenomenology data collected will influence ALARM design trades.

Background data useful at Critical Design Reviews (e.g., MWIR clutter rejection).

Any innovations which may lower ALARM life cycle costs could be incorporated prior to future P31 decisions.

While planning is underway, it is likely the Tech Demo will: emphasize fast schedule and low cost; contribute to ALARM design or P31 upgrades; be flexible in implementation; free flyers on shuttle, Pegasus, etc.; be hosted on other larger satellite platforms; and not be restricted to DSP–19.

Question. Is there currently a documented requirement for the information that this demonstration program will provide?

Answer. Since the Tech Demo is not an operational system, we will not have a specific Operational Requirements Document. We will have a Draft Technical Requirements document (TRD) by the early summer 1994 which will be formatted into sections on: Phenomenology goals; and Life Cycle cost lowering goals.

We will use this TRAD to ask for contractor concepts. We will use the draft ALARM ORD as the reference for the program that we are trying to lower the costs of, but we will not impose the operational or test requirements of ALARM onto the Tech Demo—that would negate the reason for peeersuing a TEch Demo.

Question. If the technology demonstration is successful, will you have time to take what you learn and influence the ALARM design without either slowing it down of increasing ALARM program costs?

Answer. The Tech Demo will influence the ALARM program via: Phenomenology data collected will influence ALARM design trades; Background data useful at Critical Design Reviews (e.g., MWIR clutter rejection); and Any innovations which may lower ALARM life cycle costs could be incorporated prior to future P31 decisions.

These activities will not slow down ALARM or increase program costs. We have two P31 efforts planned for ALARM prior to each successive block of 4 satellites. Should the Tech Demo provide a cost saving concept, we have budgeted time and funds to take advantage.

Question. Could you take the approximately $150 million you have budgeted for the Tech Demo and use those funds to accelerate the availability of ALARM?

Answer. We have budgeted $31 million in FY 1995, and $101 million for FY 1996 99 to complete the Tech Demo. To appreciably accelerate ALARM, we would need to start the EMD phase earlier. The majority of the Tech Demo funds are in FY 1995 and FY 1996 when we are still in the Dem/VAL phase. Adding $132 million in FY 1995–99 to the $1 billion ALARM investment will result in only a slight acceleration to the ALARM schedule.

BRILLIANT EYES

Question. In fiscal year 1994, the Appropriations Conference deleted all BMDO funds for Brilliant Eyes and instead provided $140 million to the Air Force. In fiscal year 1995, BMDO has requested $120 million for Brilliant Eyes and the Air Force has requested nothing. Why is Brilliant Eyes funding back in BMDO?

Answer. Brilliant Eyes (BE) is an essential element of Ballistic Missile Defense active defense systems. It does not perform the global tactical warning/attack assessment missions of DSP and ALARM. OSD maintained BE in the BMDO budget request in FY95 and the outyears to maintain critical integration with other BMDO programs.

Question. Specifically what is the Brilliant Eyes mission, and how does it differ from that of ALARM, FEWS, or DSP?

Answer. There are two distinct mission areas these space-based systems support. Brilliant Eyes (BE) will be the space-based sensor component of the Ballistic Missile Defense system, with secondary missions of Space Surveillance and Measurement and Signature Intelligence. DSP/ALARM is the space-based sensor component of the Tactical Warning/Attack Assessment (TW/AA) system.

DSP/ALARM detects the rocket plume while the missile is boosting, enabling timely early warning information. BE allows viewing of the missile against the cold background of space and tracking through midcourse. This provides a highly accurate impact point prediction and extends the range of the ground-based radars. BE also provides an accurate aim point for the ground-based shooter, yielding increased defended area.

Question. For the past several years, both the appropriations and authorization conferences have expressed concern over a lack of a comprehensive architecture for space-based infrared systems. How can the required tradeoffs be made between ALARM and Brilliant Eyes if they are being developed in independent organizations?

Answer. Although the funding for ALARM and Brilliant Eyes (BE) will be provided by two independent organizations, the Air Force and BMDO, the execution of both the ALARM and BE programs is managed by the Air Force Program Executive Officer for Space. The System Program Offices for both programs are located at the Air Force Space and Missile Systems Center where the engineering teams work closely through Integrated product Teams.

Question. The justification material shows that the total Brilliant Eyes program funding will exceed $4.5 billion.

a. Do we get a fully deployed Brilliant Eyes system for that amount?

b. What is the projected first launch date for Brilliant Eyes?

c. Do you consider Brilliant Eyes to be a developmental program leading to the acquisition of a system, or is it a technology level of effort?

Answer. a. Yes. The current estimated acquisition cost to develop and fully deploy the Brilliant Eyes (BE) system is approximately $4.5 billion (then year $).

b. The program currently plans to launch two demonstration satellites in the fourth quarter of FY98 that will demonstrate critical stereo acquisition and tracking functions as well as collect critical target and background data to support a future deployment decision. Based on a deployment decision by 2001, the first operational launch would be 2004.

c. At the time the FY95 DOD President's budget was submitted, BE was part of the acquisition program. However, the decision to redesignate BE from an acquisition program to a technology readiness program is currently under OSD review. The current program does not result in deployment of BE.

Question. Because of funding reductions by the Congress in fiscal year 1994 and proposed reductions by DOD for fiscal year 1995 and beyond, the program has slipped. In addition, DOD will down-select to one contractor earlier than originally scheduled. What impact will this have on the technical risk and cost stability of the program?

Answer. Relying on only one contractor to fly satellites before a deployment decision increases program risk and may result in possible program cost growth due to reduced competition. Although not building and flying flight demonstration system (FDS) satellites, the second contractor is being retained to independently develop technology, develop end-to-end real-time simulations and fabricate prototype engineering model sensors. The retention of the second contractor partially mitigates the increased risk.

At this time, each contractor has completed over 20 percent of the efforts to design and launch the FDS satellite, a significant amount of effort that enables the government to select the best design at the best price with high confidence of achieving the program objectives. The Brilliant Eyes (BE) system program office will continue to apply its innovative cost engineering process to ensure cost traceability from requirements through engineering design while the non-flyer will be sure to emphasize his cost effective alternative design. Overall, given the substantial progress already made, the current BE program plan is assessed at low to moderate risk for meeting its performance, schedule and cost objectives.

Question. Has DOD ever made a formal determination as to whether Brilliant Eyes is compliant with the Anti-Ballistic Missile Treaty of 1972?

Answer. The DOD has determined that the Brilliant Eyes (BE) Flight Demonstration Satellites are compliant with the Anti-Ballistic Missile (ABM) Treaty. The DOD also determined that the "objective" BE space-based sensor system is not yet sufficiently defined to determine its ABM Treaty implications.

MILSTAR PROGRAM

Question. The Milstar satellite program has had a controversial history. However, for the foreseeable future, it will be the primary means of survivable and anti-jam communications for deployed DOD tactical and strategic military forces. Last month the first Milstar satellite was successfully put into orbit aboard a Titan IV rocket. After a perfect launch, there has been a recent payload problem. What specifically is wrong, and how important is it?

Answer. The first Milstar I satellite was successfully launched on February 7, 1994. All mechanical deployments and software uploads were completed as planned. Payload testing is proceeding to characterize the communications system performance for this first development satellite.

On February 16, 1994, the satellite experienced an anomaly. Mission controllers noticed the loss of the Super High Frequency (SHF) telemetry downlink. Satellite testing was interrupted. Telemetry and design information were reviewed and the problem was traced to a power converter or its associated input fuse in the Message Processing Unit within the Low Data Rate (LDR) payload. On February 21, 1994, the satellite was commanded to a redundant power converter. All systems are now functioning normally. Technical experts believe the probability of failure of the backup power converter to be extremely unlikely (estimated to be 1 chance in 10,000 or more).

The specific power converter in question (one of over 40 on the satellite) experienced over 5,000 hours of testing on the ground prior to launch. It was subjected to thermal and dynamic loads and over 250 turn on and off cycles. It is a highly reliable design similar to those used on other satellites since 1973. The failure has been assessed to be a random event most likely associated with debris within the power converter or a failure of its fuse. No true cause and effect relationship for the failure is evident from the satellite telemetry or analysis data.

The Air Force is currently assessing the design and will make recommendations for corrective actions, if necessary, after their review. A design change is not anticipated at this time. Preliminary statistical analyses suggest reaching the ten year design life of the satellite with 70 percent confidence; however, it is too early to make a conclusive assessment. Experience with similar electronic components suggests continued successful operation of the high reliability redundant unit.

Question. In fiscal year 1993, the Congress appropriated over $1.1 billion for Milstar and in fiscal year 1994 provided another $918 million. However, in fiscal year 1995, the Air Force is requesting only $607 million. Why has the request dropped so drastically?

Answer. In 1993 and 1994, the Milstar research and development funds for both the Milstar space segment and the Milstar terminals were included in a single program element (appropriation). In 1995, the DOD comptroller requested that we separate the funds for Milstar space segment, the terminals, and the advanced Extremely High Frequency (EHF) satellite technology development into individual program elements. Also, due to program efficiencies implemented as a result of the Bottom Up Review, the Department was able to identify prior fiscal year funds appropriated for Milstar which were used to reduce the Air Force fiscal year 1995 budget request for the Milstar space segment.

Question. In fiscal year 1994, the Congress cut $41 million from the Milstar request and then rescinded an additional $50 million in the recent Earthquake Supplemental. Despite these reductions, it appears that there is an additional $117 million that is excess to fiscal year 1994 Milstar requirements. Is this true?

Answer. The $117 million is not excess to program requirements. These funds were available from FY 1993 from efficiencies implemented for the development of satellites #3 and #4. They were then available to finance the reduction in the fiscal year 1995 budget request.

Question. What confidence do you have that your fiscal year 1995 request is not also overstated?

Answer. The Air Force requires the full fiscal year 1995 budget request for the Milstar development program to remain on schedule. Reductions would impact the delivery schedule for the Medium Data Rate (MDR) capability on Milstar II and ultimately result in increased program cost.

Question. DOD is currently developing a new Medium Data rate (MDR) payload to increase communications support for tactical users. Exactly what capabilities will the MDR payload provide?

Answer. The MDR payload will expand the capacity of the Milstar II satellite and add additional antennas and nulling capability against jamming threats. It provides an improvement in the tactical capability of the Milstar system and will provide connectivity for the Army's Mobile Subscriber Equipment, for dissemination of imagery and intelligence data, for transmission of the Air Tasking Order, and for expanded naval operations, including cruise missile targeting updates.

Question. What will be the total non-recurring cost to develop the MDR and how much of that amount have you already obligated?

Answer. The Air Force has advised us that approximately $1 billion is required to finance the non-recurring development costs of the MDR payload/satellites. The Air Force has obligated about $590 million of that effort to date.

Question. How well is the technical development progressing on the MDR?

Answer. MDR development is proceeding very close to its original schedule after the delay of the 1992 DAB review from May until October 1992. The MDR Preliminary Design Review was successfully completed in October 1993. The Critical Design Review is on track for October 1994.

Question. What is the status of the development of ground terminals which will use the MDR payloads?

Answer. The primary MDR terminal being developed by the Army is the Secure Mobile Anti-jam Reliable Tactical Terminal (SMART–T). Both development contractors recently completed hardware Critical Design Reviews and one is in the process of completing its software Critical Design Review. The Navy also has out year funding programmed to modify its EHF terminals to add MDR capability.

Question. Last year, DOD planned to put the first MDR capability on satellite number 4, launch it, then go back and retrofit number 3 with an MDR capability. This year you are going to put the MDR on number 3 first. Why is the program changing?

Answer. The program reviewed by the Defense Acquisition Board (DAB) in October 1992 planned to develop the MDR payload and to build satellite #4 as the first Milstar II satellite, then retrofit the

MDR payload onto Milstar I satellite #3. Subsequent to the DAB and in conjunction with the Bottom Up Review, the Air Force further examined more efficient ways to develop Milstar II satellites. Their new estimates showed the technical challenges of integrating the MDR payload were less than anticipated and would allow integration with satellite #3 first. The new sequence of developing satellites #3 and #4 allowed the more efficient employment of contractor labor and reduced the cost of the fiscal year 1993 program, providing funds that which allowed them to reduce the fiscal year 1995 budget request.

Question. What is the current projected date of the first launch of an MDR payload and how does that compare with what you projected last year?

Answer. The Air Force currently anticipates delivery of the first MDR capable Milstar II satellite in September 1998. It should then be ready for launch within three months, subject to an available Titan IV booster and a pad at the launch base.

Question. The RAND Corporation recently published a study that recommended terminating Milstar after the first two satellites. Have the witnesses reviewed the RAND conclusions, and if so, what are your thoughts on their findings?

Answer. We believe that the RAND report is of value as it raises some important issues, especially concerning military communication requirements in the post-Cold War era. To the extent that the RAND report focused on technical issues (such as the relative merits of the MDR vs. the LDR payloads), it was less valuable in that these issues had been examined during the 1993 Bottom Up Review.

Question. In fiscal year 1993, the Air Force began concept exploration for something called a Polar Adjunct to Milstar. Last year the Air Force, the Navy, and Advanced Research Projects Agency (ARPA) all claimed to be working on the Polar Adjunct. As a result, the Congress cut out all of the funds until it was clear as to what the requirement was and who was in charge of the program. What is the Polar Adjunct?

Answer. The polar adjunct was envisioned by the Department in 1992 to be a less costly, Milstar compatible adjunct for meeting requirements for protected connectivity above 65 degrees North latitude. Full requirements validation and alternative solutions were planned to be reviewed by the Defense Acquisition Board (DAB) in fiscal year 1994. With the changing world environment and changing threat, the Department has deferred this review until fiscal year 1997.

Question. What organization is responsible for the program?

Answer. The Air Force is currently responsible for concept definition of the polar adjunct.

Question. What funding is included in the fiscal year 1995 request for the Polar Adjunct?

Answer. There is no funding year 1995 budget.

Question. The Air Force is requesting $22.1 million in fiscal year 1995 to begin work on an advanced EHF satellite. Is that a follow-on to Milstar?

Answer. The advanced EHF satellite is envisioned as a replenishment for the four Milstar II satellites currently planned for launch in fiscal years 1999–2002. During the Bottom Up Review, the Technical Support Group identified the lack of maturity in the packaging for microwave and digital electronics as a potential risk area in downsizing the satellite payload so that it could be placed on a medium lift vehicle (MLV) for launch. Therefore, the FY 1995 request for $22.1 million is intended to be used in a focused EHF technology application effort to ensure technologies will mature sufficiently to allow a transition to a smaller payload. For that reason, it is important that we keep the resources focused on this objective. We intend to monitor this effort carefully.

Question. It appears that the first launch of this new satellite will not occur until the year 2006. Why do you need funds to start research and development eleven years before the first launch?

Answer. The goal is to put essentially the same capability currently contained in a Milstar II into an advanced EHF satellite design which can fit on a smaller medium lift vehicle (MLV) class booster. The fiscal year budget request of $22.1 million finances the first step in a focused technology application effort to begin to make progress toward that goal. These funds are required to allow the Department to realize its objective of obtaining a lower-cost EHF capability.

Question. Could this advanced EHF satellite be accelerated in time to replace any of the currently planned Milstar satellites if additional funds were available?

Answer. It is possible to accelerate development of the advanced EHF satellite such that it could be launched sooner than currently planned, but not without accepting some risk in regards to meeting the military requirements. We may find, as a result of the focused EHF technology effort, that the risk is less than previously thought and in that case, the Department will present such a program to the Congress. We are committed to providing protected connectivity in the most cost-effective manner.

Question. What launch vehicle do you anticipate using for the advanced EHF satellite?

Answer. The advanced EHF satellite is planned for launch on a medium lift vehicle (MLV). The Air Force currently plans to using an Atlas IIAS.

DEFENSE SATELLITE COMMUNICATIONS SYSTEM (DSCS)

Question. Because DOD has been slow to develop a comprehensive communications satellite master plan, this Committee has traditionally refused to provide funds to begin a replacement for the current Super High Frequency satellite master plan, this Committee has traditionally refused to provide funds to begin a replacement for the current Super High Frequency satellite system called DSCS. Does the fiscal year 1995 budget include funds for a DSCS follow-on?

Answer. No.

Question. Do you anticipate requesting any funds for such a follow-on in the out years?

Answer. Yes. However, the timing and amount of funds is currently under review. In part, it depends upon whether we pursue any joint development with allies, how much long-haul commercial service we can offload from DSCS, if we can reduce the DSCS operational constellation from five to four plus residual satellites, whether there are other life-extension alternative which may prove viable. It is important to note however, that a follow-on DSCS has the potential to provide high data rate capacity to mobile, tactical users. An additional advantage to DSCS is that its frequencies lie between two major commercial bands, enabling DOD use of both DSCS and commercial satellite bands with the use of a single antenna terminal. We will be providing more information as part of our update of the Department of Defense Satellite Communications (SATCOM) Architecture which should be complete with the delivery of the FY 1996 next year.

[CLERK'S NOTE.—End of questions submitted for the record.]

TUESDAY, MARCH 15, 1994.

BALLISTIC MISSILE DEFENSE ORGANIZATION

WITNESS

LT. GEN. MALCOLM R. O'NEILL, USA, DIRECTOR, BALLISTIC MISSILE DEFENSE ORGANIZATION

INTRODUCTION

Mr. DICKS. The Committee will come to order.

This afternoon the Committee will hold two separate hearings. The first will discuss Ballistic Missile Defense Organization programs and the second will discuss Air Force Research, Development, Test and Evaluation programs.

The Committee is pleased to first welcome Lieutenant General Malcolm O'Neill, who is the Director of the Ballistic Missile Defense Organization. The fiscal year 1995 budget request is about $3.3 billion for the Ballistic Missile Defense Organization, $700 million more than the $2.6 billion appropriated last year.

Your full statement will be placed in the record. Please summarize it for us now.

SUMMARY STATEMENT OF GENERAL O'NEILL

General O'NEILL. Yes, sir. It is a pleasure, Mr. Chairman and members of the committee, to be here today as Director of the Ballistic Missile Defense Organization and testify on the Department's Ballistic Missile Defense program for fiscal year 1995.

This calendar year has been and continues to be a year of significant redirection and change for the Ballistic Missile Defense program.

Based on the recommendations of the Department's Bottom-Up Review, the new emphasis for our Nation's Ballistic Missile Defense programs is to develop and deploy systems to protect our military forces deployed abroad.

First, National Missile Defense—the protection of the U.S. homeland from long-range missile attack—has been transformed into a technology readiness program that can rapidly respond if, and when, a future long-range missile threat emerges. We also are maintaining a focused advanced technology program to keep a strong missile defense tech base for future defensive systems. We have moved rapidly to refocus our programs and activities and to reorganize BMDO to reflect these new priorities.

BMDO's new look is one of an acquisition organization that is developing operational missile defense systems. Theater Missile Defense is our priority because it addresses a threat that is here and now. Consequently, we are committed—as the Air Force says—to putting “rubber on the ramp,” and getting highly capable missile defense systems to the field as quickly as possible.

Doing this requires the dedicated efforts of all branches of our armed services, since ballistic missile defense cuts across all of them.

With that in mind, we have brought together within the Department a group of highly talented people representing each of the armed services, including the Marines Corps, to make ballistic missile defense a reality.

We are a multi-service team that is dedicated to delivering the highest quality and most capable missile defense systems to America’s fighting men and women.

Mr. Chairman, before I conclude, I would like to express to you my appreciation for two of the committee’s staff members. We have had an outstanding working relationship with Dave Kilian over the past few years, and that tradition is continuing with Sara Magoulick, who recently took over responsibilities for our account.

My staff and I have benefitted immensely from these very meaningful professional relationships which we have used as the key indicator of congressional reaction, as we try to explain our program and better understand your concerns and interests.

This completes my opening remarks, and I would now welcome any questions or comments you have about this vital program.

[The statement of General O’Neill follows:]

Statement by
Lieutenant General Malcolm R. O'Neill, USA
Director, Ballistic Missile Defense Organization
Before The Committee on Appropriations, Subcommittee on Defense
United States House of Representatives
March 15, 1994

Thank you, Mr. Chairman and Members of the Committee. It is an honor to appear before you today as Director of the Ballistic Missile Defense Organization (BMDO) and testify on the Department's Ballistic Missile Defense (BMD) program for Fiscal Year 1995.

Before I begin my presentation on the fiscal year 1995 program, however, I would like to briefly review for the committee the evolution of the BMD program, as several significant changes have occurred during the past few years. As you are aware, the President has endorsed the Department's Bottom-up Review (BUR) which established very specific guidance with respect to the BMD program, and I would like to review this for the Committee.

BMD Program Evolution

The Ballistic Missile Defense Organization is a successor to the Strategic Defense Initiative Organization (SDIO), which was restructured in early 1993 by the Secretary of Defense. The Strategic Defense Initiative was begun in 1983 as a broad-based, integrated research and development program to explore the feasibility of eliminating the threat of weapons of mass destruction delivered by ballistic missiles of all ranges. By 1987, ballistic missile defense (BMD) technologies and system and architecture concepts were developed sufficiently to permit the Joint Chiefs of Staff to issue a formal statement of mission objectives and required system characteristics for a Phase I Strategic Defense System, which was intended to deter or, if deterrence failed, disrupt a massive Soviet first strike on the United States. Further, U.S. defense strategy at the time called for an incremental and evolutionary growth in BMD capabilities beyond the Phase I system.

With the dismantling of the Soviet Union and the end of the Cold War, the SDI program was re-oriented toward addressing regional threats caused by the proliferation of weapons of mass destruction and short-range ballistic missiles, and the threat from potential accidental or unauthorized limited attack on the U.S. arising out of the political instability among the states of the former Soviet Union. The Department's BMD approach to addressing the changing world conditions was embodied in a concept called Global Protection Against Limited Strikes (GPALS), which integrated theater and strategic defenses and emphasized global *protection* in addition to deterrence. GPALS defenses were intended to protect forward deployed U.S. forces, power projection forces, and other U.S. overseas interests against theater-range ballistic missiles; and the U.S. against a long-range limited attack of up to 200 reentry vehicles. This approach called for spending approximately $39 billion for BMD in Fiscal Years 1995 through 1999.

The BMD program is now structured to respond to the "here and now" theater ballistic missile threat and an uncertain, but evolving threat to the United States. The current structure is founded upon the President's endorsement of the 1993 Department of Defense Bottom-up Review and the Missile Defense Act of 1991, as subsequently amended in Fiscal Year 1993 and 1994 National Defense Authorization legislation. The BUR, the Presidential endorsement, and the legislation call for the United States to adhere to the 1972 Anti-Ballistic and 1994 National Defense Authorization legislation. The BUR, the Presidential endorsement, and the legislation call for the United States to adhere to the 1972 Anti-Ballistic Missile (ABM) Treaty, while seeking to assure that the Treaty is not interpreted to constrain development of advanced Theater Missile Defenses (TMD) to meet the dangerous and growing theater missile threat.

As amended, the Missile Defense Act also directs the Department to:

- maintain the option to deploy an ABM system that is capable of providing a highly effective defense of the United States against limited attacks of ballistic missiles,
- maintain strategic stability, and
- provide highly effective theater missile defenses to forward deployed and expeditionary elements of the Armed Forces of the United States and as appropriate to friends and allies.

The Bottom-up Review and BMD

The Bottom-up Review examined U.S. missile defense requirements from a perspective of identifying options that could meet future needs at an affordable cost. The BUR began by assessing the ballistic missile threat and outlined three general categories of long-range missile threats to the United States: deliberate attacks by the former Soviet Union or China; accidental or unauthorized launches from those countries; and the emergence of new long-range missile threats from potentially hostile nations.

If Ukraine, Belarus, and Kazakhstan ratify and implement START I and join the Nuclear Nonproliferation Treaty as nonnuclear states, Russia will be the only country of the former Soviet Union possessing missiles capable of reaching the United States. Once START II is implemented, Russian strategic nuclear forces will be much smaller than they are today and strategic modernization is expected to proceed at a slower pace. While China also has a few nuclear missiles that could reach the United States, its strategic nuclear force is currently quite small and it is likely to grow slowly in both size and capability over the next decade. Finally, the Intelligence Community has concluded that a deliberate attack by Russia or China on the United States would appear to be highly unlikely. Accidental or unauthorized launches of Chinese or Russian nuclear missiles are also considered unlikely.

Finally, while no other potentially hostile nation currently possesses the capability to threaten the United States with ballistic missiles, the possibility of a limited, long-range ballistic missile threat from the Third World sometime in the first decade of the next century cannot be excluded. In this context, I would like to defer to the expertise of James Woolsey, Director of Central Intelligence, on such matters. Last year he testified to the development of a Third World ICBM threat to the United States and noted that:

> . . .After the turn of the century, some countries that are hostile to the United States might be able to acquire ballistic missiles that could threaten the continental United States. We can't give you a precise date -- whether its eight years or ten years or fifteen years from now -- by which that might occur.
>
> . . .A short-cut approach that's prohibited by the Missile Technology Control Regime and by the Nonproliferation Treaty would be for such Third World countries to buy ICBMs or major components covertly together with suitable nuclear warheads or

fissile materials. Anything such as that would, of course, speed up ICBM acquisition by such nations.

A different threat of particular concern in the post-Cold War period is the proliferation of shorter-range ballistic missiles armed with nuclear, biological, or chemical warheads. Ballistic missile deployments are expected to increase worldwide, despite stepped-up efforts to inhibit their proliferation, and several countries other than the acknowledged nuclear states are developing both nuclear weapons and ballistic missiles. Similarly, a number of countries have or are developing chemical or biological weapons that could be delivered by ballistic missiles. Of particular concern are those missile programs in India, Pakistan, Iran, Iraq, Syria, Libya, and especially North Korea -- all of which have or could develop weapons of mass destruction for use on their ballistic missiles.

I would like to once again quote the Director of Central Intelligence, James Woolsey, whose judgements on the ballistic missile threat are most relevant:

> Ballistic missiles are becoming the weapon of choice for nations otherwise unable to strike their enemies at long range. Today there are 25 countries, many hostile to our interests, . . .that are developing nuclear, biological, or chemical weapons. . .some of these countries may place little stock in the classic theory of deterrence which kept the cold war from becoming a hot one. . .

A case in point is North Korea. In January of this year Mr. Woolsey noted that "North Korea could already have enough plutonium for at least one nuclear weapon" and that its "missiles, including those in the 1000 kilometer range. . .can be made capable of carrying nuclear, chemical, or biological weapons."

The BUR's sober assessment of the existing and emerging ballistic missile threats provided the foundation for determining the appropriate programmatic response. The BUR considered a range of TMD options. However, all options included a "core" set of TMD systems consisting of an enhanced version of the existing land-based Patriot air and missile defense system, called Patriot Advanced Capability, Level-3 (PAC-3); the sea-based AEGIS/Standard Missile Block IVA; the land-based Theater High Altitude Area Defense (THAAD) missile system; and battle management/command, control, communications and intelligence (BM/C3). (These Core TMD programs are detailed below in the section highlighting the Fiscal Year 1995 Theater Missile Defense program.) In considering the proper approach to Theater Missile Defense, the Bottom-up Review stimulated the generation of a course that also included the exploration of three advanced TMD concepts, with one of those three entering the demonstration/validation phase of the acquisition process in Fiscal Year 1998. The Bottom-up Review estimated that about $12 billion would be needed in Fiscal Years 1995 through 1999 to implement the TMD program.

In recognition of the low probability of a long-range ballistic missile attack from the former Soviet Union or China, but to preserve a hedge against acquisition or indigenous development of a long-range ballistic missile capability by another potentially hostile nation, National Missile Defense (NMD) efforts were designated as a second priority relative to TMD. In evaluating options for national missile defense, three main factors were considered:

technological promise, responsiveness to the projected threat, and ABM Treaty compliance. Various NMD architectures were examined by the BUR, consisting of the Ground-based Radar (GBR) and the Ground-based Interceptor (GBI), with and without the Brilliant Eyes (BE) space and missile tracking system. Four different development approaches were analyzed.

The Bottom-up Review determined that a prudent option to pursue would be one that focused on achieving and maintaining technical readiness to move NMD into the system acquisition process. This will be accomplished by emphasizing risk reduction programs, key technologies, and activities to resolve critical technical issues and reduce deployment timelines. The technology readiness effort would concentrate upon exoatmospheric interceptors, space-based passive sensors, ground-based active sensor, BM/C3, and those technologies and practices required to ensure their eventual integrability. The Bottom-up Review determined that this option would cost about $3 billion over the FYDP, including funds for the space and missile tracking system (Brilliant Eyes) which has been funded by the Air Force in Fiscal Year 1994. This NMD technology readiness option would also, in conjunction with TMD and research activities, preserve an adequate industrial base in critical ballistic missile defense technology areas.

The BMD Budget: FY95 and Beyond

Since the announcement of the BUR, the Department has removed $1.1 billion in program growth from the Fiscal Year 1995-1999 program, partially offset by increased escalation, resulting in a total FYDP funding of approximately $17.6 billion, with the reduction applied primarily to Theater Missile Defense efforts and Brilliant Eyes to maintain a balanced BMD program. The following chart outlines the Fiscal Year 1995 budget request for the BMD program.

BALLISTIC MISSILE DEFENSE ORGANIZATION FY 95 PRESIDENT'S BUDGET

TY $ In Thousands

	FY 93	FY 94	FY 95
• RDT&E			
- Theater Missile Defense			
– Advanced Tech Dev 6.3	341,683	393,457	479,131
– Demonstration / Validation 6.4	685,375	1,080,490	1,071,283
– EMD 6.5	0	42,097	217,755
- Ballistic Missile Defense			
– Exploratory Development 6.2	120,210	73,053	106,460
– Advanced Tech Dev 6.3	2,052,780	829,301	769,993
– Demonstration / Validation 6.4	209,900	0	120,000
– Management Support	218,352	198,802	215,233
Total RDT&E	3,628,300	2,617,200	2,979,855
• Procurement			
- Theater Missile Defense	75,200	120,719	273,390
• MILCON			
- Ballistic Missile Defense	2,500	2,727	530
Total BMDO	3,706,000	2,740,646*	3,253,775

* Does Not Account For $10M Recission Or $22.9M Reprogramming

The Fiscal Year 1995 budget request for the Ballistic Missile Defense Organization is $3.25 billion. The Department is requesting $1.77 billion for Theater Missile Defense RDT&E and $270 million for Theater Missile Defense procurement efforts. The National Missile Defense Technology Readiness RDT&E program is budgeted for approximately $587 million. The remaining $625 million is requested for Research & Support activities, to include exploratory development, advanced technology development and management support activities.

Our current FYDP profile, at approximately $17.6 billion, represents a 55 percent reduction in out year spending relative to the FYDP prior to the Bottom-up Review. I would also like to note that the current FYDP includes a total of approximately $3 billion of procurement expenditures to purchase Theater Missile Defense systems -- an amount that increases each year across the FYDP from the $270 million level requested this year to over $1 billion by Fiscal Year 1999.

Theater Missile Defenses: Getting "Rubber on the Ramp"

As part of the BUR, the Department assessed the proliferating ballistic missile threats emerging throughout the world, analyzed various TMD systems to determine the prudent programmatic response, estimated the costs, and has outlined a clear commitment to develop and deploy effective missile defenses that are both responsive to the threat and affordable. Our TMD efforts can be grouped into three main categories: near term initiatives that provide relatively inexpensive upgrades to existing air and missile defense systems; Core TMD programs that provide a substantially increased defensive capability against theater ballistic missiles; and advanced TMD concepts which involve concept exploration activities for systems that could enter the acquisition phase down the road.

At this point I would like to stress that the Department has heard loudly and clearly Congress' concerns about multiple TMD interceptor candidates. The Department, as part of the BUR and in our continuing approach to TMD, is making the difficult choices required to "neck down" our TMD interceptor options. In light of this, I would like to spend a few minutes outlining the TMD programs so there is little doubt the Department is following through on the Congress' strong direction in this area.

As I noted, TMD consists of three sequential efforts. First, we are making near term improvements and enhancements to existing air and missile defense systems. For example, funds appropriated to BMDO directly enhance our missile defense capabilities today. BMDO's proposed Fiscal Year 1995 budget, supports a Marine Corps Tactical Missile Defense (TMD) Initiative that provides a basic TMD capability for the Marine Corps to sustain an interim point defense of vital assets in the amphibious operating area. Our budget request includes approximately $30 million for this effort in Fiscal Year 1995. This TMD capability will be accomplished through product improvements to the TPS-59 Radar and Hawk missile system and through development of the Air Defense Communications Platform. These developments will provide the Marine Corps an important, near-term operational TMD capability in an area that represents a lucrative target to theater ballistic missiles: amphibious points of debarkation. Such a near-term product improvement represents an important interim capability -- or bridge -- until the TMD programs deliver maritime and expanded ground-based TMD for protection of the amphibious force.

Near-term improvements also include enhancements to the PATRIOT Advanced

Capability Level-2 (PAC-2), and both more accurate and faster launch detection and sensor cueing. PAC-2 upgrades include rapid, accurate, fire unit emplacement; a capability to remotely locate launchers from the radars that greatly expands defended areas; radar enhancements to improve ballistic missile detection; and missile guidance enhancement to extend PAC-2's defended footprint and increase lethality. The initial radar improvements will complete fielding in Fiscal Year 1995, the same year improved missiles will begin to be fielded.

Improved launch detection will provide earlier targeting opportunities for active Theater Missile Defense elements and earlier warning for missile defenses and counterforce operations. Improved launch detection is achieved by fusing data from sources like the Defense Support Program satellites. BMDO is supporting the integration of three related early warning programs: the Air Force's Talon Shield, the Navy's Radiant Ivory, and the Army-Navy Joint Tactical Ground Station (JTAGS). The JTAGs test bed has been deployed to Europe providing an initial capability and Talon Shield at Colorado Springs, Colorado will reach an initial operational capability, including integration of Radiant Ivory data, in October of this year. These programs dramatically, and immediately, improve capabilities beyond Desert Storm levels.

Over-the-horizon Sensor cueing of a fire control radar extends the radar's detection range and increases the protected area. These enhancements are particularly important in the presence of jamming and weather clutter. Recent sensor cueing demonstration tests at White Sands Missile Range have been very successful in extending the range of PAC-2 fire control radar. Additional tests using multi-Service equipment are planned for Fiscal Year 1995. My objective is to make sure that we fully exploit the intrinsic capabilities of our existing air and missile defense systems providing improved defenses in the interim period prior to Core TMD program maturation and deployment.

To improve our interaction with the warfighter, we have initiated a Commanders-in-Chief Theater Missile Defense (CINC TMD) Experiments Program which inserts TMD into existing CINC exercises in order to increase the warfighters' understanding of TMD capabilities and to help them develop and refine their tactics. CINC TMD experiments have been conducted by the European Command, Central Command, and Pacific Command. Experiments are planned for Atlantic Command as part of its preparation for Joint Task Force 95. Additional CINC TMD exercises are being planned for Fiscal Year 1995.

Core TMD Programs:

As I noted above, the BUR determined that three TMD systems were of such critical importance as to constitute the "core" TMD effort and, therefore, a central focus of our TMD effort includes this Core set of TMD systems.

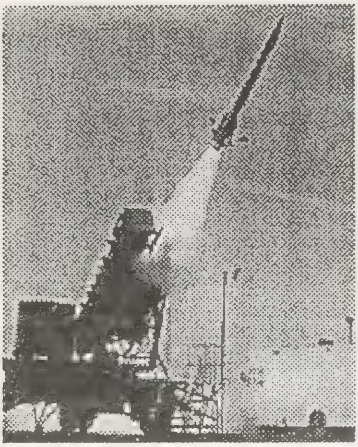
It is vital to understand that the theater ballistic missile threat is complex, and cannot be addressed by any single TMD system. Theater missiles currently exist in a variety of ranges from hundreds to thousands of kilometers. The deliver a variety of lethal warheads, and are located in numerous and diverse geographic locations. Recognizing that there are important policies being pursued to limit further proliferation of these weapons, reliable intelligence estimates nevertheless, forecast qualitative and quantitative growth. Without developing and fielding a responsive mix of advanced TMD systems, theater ballistic missiles will continue to threaten U.S. forward deployed forces, and our friends and allies.

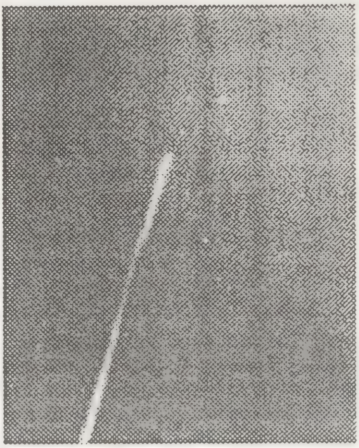
Patriot Advanced Capability Level-3 (PAC-3) - While the PAC-2 was used with some success against the modified Iraqi Scud missiles during the Gulf War, the immediacy of the tactical ballistic missile threat strongly supports the rapid development and deployment of the PAC-3 missile defense system. PAC-3 will provide greater lethality, range and accuracy, and more effective capability against tactical ballistic missiles. PAC-3 will include an improved fire-control radar and a new interceptor missile. I would like to note that the Department's Defense Acquisition Board is scheduled to complete selection of the interceptor missile for PAC-3 on April 21, 1994. To date, the Army has recommended that a new hit-to-kill missile (ERINT) is the appropriate candidate. However, prior to the DAB, the Department is sponsoring an independent review to insure that the best technical solution was recommended. During its last two flight tests, the ERINT missile successfully intercepted its targets, one of which carried a simulated countermeasure payload. On the following page is a series of photographs depicting the first ERINT intercept test last November. We are requesting $541.5 million in Fiscal Year 1995 in total for the PAC-3 program. This includes $69.2 million for demonstration/validation efforts, $217.2 million for engineering and manufacturing development, and $255.1 million for procurement. Our plan is to fielding the first PAC-3 systems by Fiscal Year 1998.

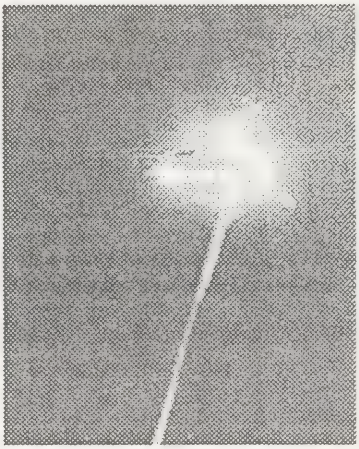
Navy Lower-tier TMD (AEGIS/Standard Missile Block IVA) - In many instances, a naval TMD capability could be in place within a regional conflict area to provide TMD protection for land-based assets before hostilities erupt or before land-based defenses could be transported to the theater. For instance, our forces may have to fight their way into the theater, in which case naval combatants could provide important TMD coverage early in the conflict. Therefore, the Navy and BMDO have been cooperatively working to develop an enhancement to the AEGIS/Standard Missile air defense system that would provide a tactical ballistic missile defense capability -- similar to that provided by the PAC-3 -- from the sea. The Navy currently deploys AEGIS cruisers and a growing number of destroyers equipped with the Standard Missile for air defense operations. The Standard Missile Block IVA program will capitalize on this existing infrastructure by fielding upgraded Standard missiles and software improvements to the AEGIS radar to provide a sea-based TMD capability. We are requesting $194.039 million in Fiscal Year 1995 for the sea-based lower-tier program. Our plan is for the first AEGIS cruisers to be equipped with the sea-based lower-tier TMD system by Fiscal Year 1999.

Theater High Altitude Area Defense (THAAD) - As the most critical element in the "core," THAAD is the first TMD system which has been designed to fully match the existing threat. While modifications to present systems deal with many existing theater ballistic and cruise missile threats, the THAAD system allows multiple shot opportunities to intercept longer-range and more capable theater ballistic missile threats. Multiple shot opportunities, coupled with THAAD's longer range interceptor, will assure that theater ballistic missiles carrying weapons of mass destruction are neutralized at higher altitudes and longer ranges from the defended area than current generation defense systems. When deployed with either a PAC-3 or AEGIS/Standard Missile Block IVA as a lower defensive tier, THAAD would represent the centerpiece of a highly effective integrated defense of critical areas. We are requesting $495.69 million in Fiscal Year 1995 for the THAAD program. Our plan is to develop a prototypical THAAD battery as a user-operational evaluation system (UOES) at the

ERINT HIT-TO-KILL FLIGHT TEST
NOVEMBER 30, 1993







end of the Demonstration/Validation phase as early as 1996 for early operational assessment and possible deployment if a contingency arises. Provision of the UOES is a major thrust and priority of the TMD program. Deployment of the objective THAAD system is planned for Fiscal Year 2002.

Theater Missile Defense Ground-based Radar (TMD-GBR) - The TMD-GBR meets an immediate requirement for a more capable wide-area defense radar to provide surveillance and fire control support for the THAAD missile system and cueing support to lower-tier systems such as PATRIOT. The TMD-GBR utilizes state-of-the-art radar technology to accomplish its required functions of early warning, threat type classification, interceptor fire control, external sensor cueing, and launch and impact point estimation. In particular, TMD-GBR will be able to provide a capability to perform threat classification against theater tactical ballistic missiles, and then, kill assessment after intercept. In addition to providing fire control support for THAAD and cueing support to the lower tier, the TMD-GBR also will have a residual capability against air-breathing threats. We are requesting $173.2 million in Fiscal Year 1995 for the TMD-GBR program.

Battle Management/Command, Control, Communications and Intelligence (BM/C3I) - Perhaps no area depends more on "jointness" and multi-Service interoperability than BM/C3I. Accordingly, BMDO is taking an aggressive lead to establish an architecture that all the Services can build upon and is actively pursuing three thrusts to ensure an effective and joint BM/C3I. The first thrust establishes the capability for in-theater dissemination of launch warning information from space-based and other intelligence systems. The second thrust focuses on communications interoperability via the Joint Near Real Time Data Net. The third thrust supports upgrades to command and control centers of the Joint Staff and the Services. BMDO's acquisition strategy takes advantage of the large inventory of BM/C3 assets already available in the theater and maximizes the use of existing command center and communications capabilities. This approach minimizes costs and provides an enhanced early combat capability. Some modifications will be required to account for the unique features of TMD, but these can be accomplished at less cost, both in terms of time and financial resources. The primary focus will be on interoperability and the free exchange of improved warning and surveillance data. We are requesting $34.1 million in Fiscal Year 1995 for these TMD BM/C3 activities.

Advanced TMD Capabilities:

Additional TMD efforts will involve concept exploration activities for a potential sea-based upper-tier, defense for maneuvering ground forces (Corps SAM), and a boost phase interceptor system. A decision to proceed with further development of these advanced and longer-term systems will be based on a rigorous acquisition decision process. An advanced concept will be considered for a new acquisition start based on national priorities, current and projected threat, maturity, capability, effectiveness, lethality, operational need, and affordability. This process will include advanced technology demonstrations to provide early capability and acquisition risk in addition to cost and affordability analyses. We project that the BMDO budget will support initiation of one new acquisition program in Fiscal Year 1998.

Sea-based Wide Area - Sea-based concepts for wide area, higher altitude missile intercepts (upper tier) take advantage of the Vertical Launch System on naval combatants and offer very long-range intercept potential against theater ballistic missile threats. The sea-based systems, which could be among the first deployed TMD systems in a regional crisis, could provide extensive areas of protection. Sea-based wide area defense couples the combat system modifications developed for area defense with an exo-atmospheric interceptor. Sea-based upper-tier technologies include: THAAD, THAAD hit-to-kill vehicles, lightweight exo-atmospheric projectiles (LEAP), Navy Standard Missile air frames, and advanced solid axial stage rocket motors. The $17.725 million requested in Fiscal Year 1995 will allow for continuation of concept definition, THAAD-AEGIS compatibility studies, and acquisition-related analyses.

Corps SAM - This new mobile air and missile defense system would protect Army or Marine maneuver forces against short-range ballistic missiles and advanced cruise missiles fired from any direction. In addition, we plan for Corps SAM to be more transportable, mobile, and have more on-line missiles per battery than the PAC-3. Corps SAM concepts have already been developed and preparation for an acquisition program start, along with concept maturation activities, are contemplated. The Department proposes $17.725 million for Corps SAM in Fiscal Year 1995. A major initiative in international cooperative development is being contemplated for Corps SAM due to the similarity of military requirements between it and both European and Asian concepts.

Airborne Boost Phase Intercept - Ballistic missiles, regardless of range, can be targeted and countered during their boost phase. Therefore, concepts which employ airborne systems for attack of missiles in the boost phase offer the potential to destroy attacking missiles over enemy territory and would be effective particularly against advanced delivery system countermeasures. The Department is requesting $61.1 million for kinetic energy Boost Phase Intercept programs in Fiscal Year 1995, leading to technology and operational concept demonstrations in Fiscal Years 1998 and 1999.

Cooperation with the Allies

The United States has long pursued active programmatic and policy dialogue with its European, Asian, and Pacific allies, as well as with Israel on ballistic missile defenses. In developing its BMD program, specifically its TMD systems, the United States will be looking to cooperate with many of its allies and friends who share the problems arising from the proliferation of ballistic missiles and weapons of mass destruction. In both bilateral and regional fora, the Administration has stressed the operational importance of cooperative efforts with alliance partners and friends in development, production and follow-on support of weapons systems in general, and TMD systems in particular. In an era of declining budgets, cooperation is especially important. The Department will pursue opportunities to enhance the return on scarce research, development, and acquisition resources. Cooperation with allies and friends will be conducted in a manner consistent with U.S. international obligations, such as the ABM Treaty and the Missile Technology Control Regime guidelines.

Historically, a "core group" of allies and friends have been involved in the BMD program: NATO Countries, Australia, Japan, South Korea, and Israel. The BUR decision to emphasize TMD has tended to move our activities with allies from exclusively basic R&D toward development and procurement programs. We are exploring opportunities for cooperation with them that is consistent with our existing security relationships and guarantees.

The NATO Conference of National Armaments Directors (CNAD) recently established an Extended Air Defense/Theater Defense Ad Hoc Working Group (AHWG) composed of interested nations with resources to contribute to TMD. This group is chartered to exchange views on the tactical ballistic missile threat to the Alliance and to define future opportunities and methods of collaboration in the area of TMD. Participants in the U.S. chaired AHWG are: Canada, France, Germany, Italy, the Netherlands, and the United Kingdom. The U.S. is also participating in separate bilateral TMD working groups with France and Japan.

The Fiscal Year 1994 Defense Authorization Act established a special account in the U.S. Treasury designed to accept contributions of money from any nation or international organization for use by the Department of Defense in support of TMD programs. This element of potential foreign support or contribution to the U.S. TMD program is being discussed with our friends and allies. Their participation may include such contributions in the future in accordance with their budget approval process.

Theater Missile Defense System Testing

I would like to take a moment to address for the Committee the impact of a provision in the Fiscal Year 1994 Defense Authorization Act. Section 237 directed that the Secretary "may not approve a theater missile defense interceptor program proceeding into the Low-Rate Initial Production (Milestone IIIA) acquisition stage until the Secretary certifies to the congressional defense committees that more than two realistic live-fire tests, consistent with section 2366 of title 10, United States Code, have been conducted, the results of which demonstrate the achievement by the interceptors of the weapons systems performance goals specified in the system baseline document. . .before the program entered engineering and manufacturing development. The live-fire tests demonstrating such results shall involve multiple interceptors and multiple targets in the presence of realistic countermeasures."

This provision requiring interceptor performance to be demonstrated solely through the use of live-fire testing will be exceedingly expensive and likely increase the acquisition time needed to get interceptor programs into production and fielded. Augmenting live-fire testing with modeling and simulation has been shown to provide a less expensive and fully validated method for predicting interceptor performance. My staff estimates that compliance with this provision could incur unforeseen costs of about $400 million for Fiscal Years 1995 through 1999 to conduct multiple simultaneous engagements for TMD interceptor programs. More accurate cost estimates will be available as the TMD programs mature and actual testing costs are determined.

I would like to note that the requirement for demonstrating interceptor performance to achieve multiple shot engagements involving multiple interceptors and multiple targets is traditionally conducted during Initial Operational Testing and Evaluation (IOT&E). The IOT&E is conducted at the end of the engineering manufacturing and development (EMD) acquisition phase prior to entering the production and deployment phase of Milestone III. Section 237 would require BMDO to conduct such tests prior to beginning Low Rate Initial Production. The rationale for conducting multiple shot engagements during IOT&E is that it provides time for system maturing during the EMD acquisition phase to obtain a level of performance capability necessary to conduct multiple shot engagements. Under section 2399 of title 10 United States Code, the Department is already required to report to Congress on TMD interceptor performance. The Director of Operational Test and Evaluation, Office of the Secretary of Defense, prepares and submits a Beyond Low-Rate Initial Production Report to the Secretary of Defense, Under Secretary of Defense (Acquisition) and the Congressional Defense Committees. This report will confirm that adequate testing has been conducted in an operational environment consistent with what the interceptor will be expected to operate in when fielded to evaluate system performance prior to committing to a production decision.

A legislative proposal to amend Section 237 of the Fiscal Year 1994 Defense Authorization Act to expand the methods of test and evaluation used to demonstrate interceptor performance has been included in the Department's Omnibus Bill proposal for the legislative program for the second session of the 103rd Congress. I would urge the Committee to support this proposed amendment. I would like to work with the four Defense Committees to amend Section 237 in a manner that simultaneously addresses Members' concerns while also allowing the Department to quickly and affordably develop and deploy effective Theater Missile Defenses.

National Missile Defense Technology Readiness

In light of the intelligence assessments regarding the long-range ballistic missile threat to the United States, the BUR reoriented the National Missile Defense program into a Technology Readiness program, structured to provide the ability to rapidly develop and deploy ballistic missile defenses for the United States should a threat emerge in the future. Our NMD program provides for improved capability of BMD components in a structured and evolutionary manner. The Department's reorientation of the NMD program is consistent with Fiscal Year 1994 Congressional guidance to "conduct a research and development program to develop and maintain the option to deploy" a defense for the United States.

The Department requires funding the NMD Technology Readiness program at $587 million in Fiscal Year 1995 and approximately $600 million per year through the FYDP as a hedge against the emergence of a long-range threat. The NMD program is focused and consistent with the Congress' directions, as outlined in the Conference Report accompanying the Fiscal Year 1994 Defense Authorization Act, that "priority funding. . .shall be placed on those projects aimed at resolving the key system-level technical challenges associated with a limited defense system." Further, NMD efforts "lead to reduced lead-times for deployment in response to a future threat." The NMD Technology Readiness Program must be highly focused, and not allow funds to be "expended across a broad array of 'technology development' activities."

In response to the Bottom-up Review and Congressional guidance, I have established a series of "Epochs" beginning in Fiscal Year 1995 to incrementally increase our technological capability and reduce the lead time to deploy a National Missile Defense, should we be directed to do so. The baseline NMD architecture as described in the Fiscal Year 1994 Report to Congress will remain the guiding technical foundation for the NMD effort, with the epochs representing "way points" for DoD to most effectively react in a timely manner to unexpected threat developments and deployments. The initial Epoch will focus on resolving the key technical challenges we face to develop an initial capability. Key activities will include improving the exo-atmospheric kinetic kill vehicle (EKV) for a Ground-based Interceptor, as well as conducting on-going contingency deployment planning. The EKV effort will evolve from the highly successful ERIS technology and GBI concept definition program and leverage both the LEAP and THAAD efforts. The space and missile tracking system (Brilliant Eyes) program will continue to develop demonstration satellites, while technology for an NMD Ground-based Radar will evolve from the TMD GBR program.

Later Epochs will build on the technical progress made in the first Epoch. However, a key emphasis of these Epochs will be executing activities specifically designed to counter a more capable threat while reducing our lead time to deploy should a decision be made to do so. Our technical activities will include continued testing of the EKV to reduce technical risk and increase reliability and confidence in the system, and the integration of a radar technology demonstrator at the Kwajelein Missile Range made from components of the TMD demonstration/validation Ground-based Radar. A space and missile tracking system flight demonstration, developed as an interim step towards a fully mission capable system, will be conducted.

The NMD Technology Readiness Program must be structured in such a way as to be flexible to changes in the environment. Depending on technical progress and the emerging threat to the United States, we must adjust the content of the technology readiness program to be responsive to national requirements.

The incremental approach to increasing our technical capability and decreasing our lead time to deploy provides a low risk, affordable, and methodical approach to address our technical, deployment readiness, and funding issues. This approach does not include planned entry into full system development, nor is it a commitment to deploy. It is, I believe, a prudent approach to develop and protect an evolving deployment option should fielding be required in the future.

Space and Missile Tracking: Needed for Both NMD and TMD

Missile tracking satellites (Brilliant Eyes) offer the potential for significantly enhancing the capabilities of both NMD and TMD systems, as their contributions cut across all BMD systems. Missile tracking satellites would provide an autonomous missile tracking capability for a number of regions of interest, or if cued by global surveillance satellites, they could observe missiles soon after their launch. The unique contribution of these missile trackers is high-precision midcourse data, which allows interceptors to be launched very early. This means that intercept ranges and shot opportunities would increase, particularly for long-range, wide-area TMD defensive systems such as THAAD, sea-based upper-tier and for NMD Ground-based Interceptors. This capability is not provided by any other current or planned space-based system.

Should a National Missile Defense deployment decision be made, strategic missile tracking satellites could be deployed to provide support to a single site NMD system. With the development of the upper-tier TMD weapons, more accurate and timely threat track data than currently available will be needed to take full advantage of these interceptors' capabilities. The Brilliant Eyes midcourse tracking system is able to provide this important data.

BMD Advanced Technology

While the Bottom-up Review established TMD and NMD as our first and second priorities, it clearly established the requirement for a focused, albeit lean, technology base effort. This is because the Department recognizes that technology simply does not stand still. This is true of both offensive and defensive technologies. Threatening offensive systems, against which ballistic missile defenses are designed, may not only proliferate in numbers but may also tend to become more sophisticated over time. Similarly, defensive technologies can become more sophisticated and capable as our RDT&E experience broadens our technical horizons. To maintain the vitality of a BMD architecture over time, therefore, technologies must be developed to provide options for improvements to planned and deployed defenses, giving them new capabilities to respond to a range of needs. Among the most important of these needs are: (1) capabilities to meet potentially straightforward countermeasures; (2) ability to cope with threat evolution that complicates an effective defense; and (3) affordability and sustainability improvements as military users gain operational experience.

To prepare to meet these future needs, advanced technology programs will invest in high leverage technologies across a reduced set of thrusts which include: kinetic energy interceptors; advanced surveillance and targeting sensors; directed energy defenses; innovative science and technology; and small business innovative research efforts. The high potential payoffs include:

- boost phase TMD intercepts that assist in defeating tactics and warhead deployments designed to counter midcourse and terminal tier defenses;
- continuous coverage, to provide defensive capabilities against surprise attack or during early stages of rapidly escalating conflicts;
- exo- and endoatmospheric intercepts with a high probability of kill at lower cost, thus expanding battle space, enlarging defended areas, and overcoming simple countermeasures; and
- multi-sensor detection, tracking and discrimination that extends through the missile flight path and supports assured targeting.

Additionally, funding is proposed for activities that will provide much needed research into potential countermeasures, threats and threat development, civil engineering, architecture and studies, technology transfer, and test and evaluation support. To support these technology efforts, the Department is requesting a total of $409 million in Fiscal Year 1995.

Over the past few years, in compliance with Congressional direction and in consonance with the Bottom-up Review findings, the Department has significantly restructured the BMD technology program. As required by the Fiscal Year 1994 Defense Authorization Act, the Secretary of Defense will soon forward to the four Defense Committees a report that identifies those far-term follow-on technology programs that will be transferred to either ARPA or the Services, and those that should be retained in the Ballistic Missile Defense Organization.

I would like to note that today only those programs that either directly support future TMD and NMD system developments, or hold significant promise for advanced BMD systems, remain under the management responsibility of BMDO. In instances where those programs have significant collateral applications to other military missions, technical information is shared with the interested military department. The ongoing advanced technology program supports the Department's long term commitment to continue, at a stable level, critical research on technologies that build on work to date in order to prepare for more capable and affordable active Ballistic Missile Defense systems

The BMD Program and the ABM Treaty

While all of BMDO's testing and development activities will remain compliant with the "narrow" interpretation of the ABM Treaty, the Department is planning to develop and deploy theater/tactical missile defense systems to counter the projected threat to our forces abroad and to our allies. Although the objective of the ABM Treaty is to limit defenses against *strategic* ballistic missiles, there could be conflicts between the Treaty and the development and deployment of some of the *theater* missile defense systems under consideration. The Administration is currently studying this issue and is developing its negotiating strategy consistent with the Missile Defense Act, as modified, as it engages in discussions with the former Soviet Union in the Standing Consultative Commission (SCC).

To assure compliance, the Department has in place an effective process under which key offices in DoD are responsible for overseeing BMD compliance with all the United States arms control commitments. Under this process, the DoD ensures that the implementing program offices adhere to DoD compliance directives and seek guidance from offices charged with oversight responsibility, and certify internal compliance periodically. At this point I would like to point out that currently no experiment has been approved that is not in strict conformity with the "narrow" interpretation of the ABM Treaty.

The Fiscal Year 1994 Defense Authorization Act directed the Secretary of Defense to review six theater missile defense systems or system upgrades and the Brilliant Eyes system to "determine whether the development, testing, or deployment of that system or system upgrade would be in compliance with the ABM Treaty". The Department is complying with the Act's direction. We did not and will not exceed the Congressionally-mandated limitations on funding prior to the submission of these reports. These reports will clarify the status of these systems relative to the ABM Treaty, as we seek to test, and develop and deploy these much-needed systems while observing the limits of the ABM Treaty.

Conclusion

In closing, I would like to point out that Fiscal Year 1995 is a critical year for Ballistic Missile Defense programs. Last year the program absorbed a severe budget reduction. Quite frankly, it cut the BMD program to the bone. If the Department is going to field effective Theater Missile Defenses by the end of this decade -- and protect the option to develop defenses for the United States -- this program cannot sustain similar reductions. As I noted earlier, the Bottom-up Review recommended a prudent funding profile for the BMD program starting in Fiscal Year 1995 and continuing in the out years. I think it is important to note that the peak budget request in the Fiscal Years 1995 to 1999 FYDP does not exceed the budget appropriated by Congress in Fiscal Year 1992 for this program.

The Department has assessed the strategic and theater ballistic missile threats, exhaustively reviewed program options, made some very difficult acquisition decisions, and selected a prudent and affordable program that will develop and deploy effective theater missile defenses, while both preserving an option to defend the Nation as a strategic threat emerges and preserving an advanced technology program. However, it is important to note that we no longer have a robust program in directed energy research for lasers and particle beams. We no longer have funds for a space-based interceptor program called Brilliant Pebbles. We no longer have the resources to carry programs and experiments that, while testing scientifically important technologies, have not allowed us to focus dollars upon putting "rubber on the ramp." While I realize that each of these and many other programs had many important supporters -- whether in Congress, industry, the national laboratories, NASA, or the Department of Defense -- the bottom line remains we simply cannot afford to hold onto everything we once pursued. The BMD program today is an intensely focused effort to develop and deploy effective theater ballistic missile defenses as soon as possible. The remaining BMD resources for National Missile Defense and Advanced Technology are very limited and cannot be decremented without serious risk either to our options for strategic defense or our ability to respond to threat modernization.

I think most Members will agree with me when I say that the Fiscal Year 1995 BMD program is responsive to a time of reduced resources. Moreover, I believe this program is directing its efforts on the most pressing ballistic missile threats of today and the near future. While we are working diligently to field enhanced and new TMD systems as soon as possible, we will simultaneously protect our options -- by developing and maintaining the needed technologies -- to deploy a National Missile Defense system should the threat arise and respond credibly to an evolving threat.

I appreciate that this is but one program within the Department, and that there are many other valid demands on the Federal budget. Vital U.S. counterproliferation programs include diplomacy, dissuasion and deterrence, but active ballistic missile defense must remain as an insurance policy if these other measures fail. To this end, I assure you it is a priority of the Department to field effective missile defenses so that in a future conflict, our Servicemen and women will not be left vulnerable to the threat of ballistic missile attack and the weapons of mass destruction they may deliver. We want to assure that in a future conflict an adversary cannot threaten to use his ballistic missiles to undermine our ability to build and maintain coalitions, and cannot launch missile strikes that would inflict severe damage upon our military forces arrayed against him.

I look forward to working with the Members of this Committee, as well as the entire Congress, to make highly effective and affordable ballistic missile defenses a reality. Mr. Chairman, that completes my opening statement. I am ready for your questions.

BOTTOM-UP REVIEW

Mr. DICKS. The Bottom-Up Review recommended $18 billion for Ballistic Missile Defense programs over the next five years, with the emphasis to be on theater missile defense. DOD has provided $17 billion for ballistic missile defense in its five-year spending plan.

We understand that the $1 billion cut was taken in theater programs. Since theater programs are a higher priority than national programs, why was the cut taken there?

General O'NEILL. The results of the Bottom-Up Review were looked at. I didn't participate in the Bottom-Up Review. I was given the product.

Mr. DICKS. How carefully did they look at ballistic missile defense in the Bottom-Up Review?

General O'NEILL. They looked carefully at theater missile defense. They obtained priorities from the Joint Staff, had inputs from the services, from OSD staff, input from my staff.

We had one representative on the Bottom-Up Review Group. The process was about a three-week to month-long process and I think to the extent they understood it, I think they did a very good job, but it was my job after the results of the Bottom-Up Review to critique that review and then to face a $1 billion cut.

In discussions with Mr. Deutch, I explained to Mr. Deutch that as I looked across the program and I saw that our program needed to have three pieces. It needed to have a theater missile defense piece, a defense of the homeland or a national missile defense piece, and it needed to have an advanced technology piece so that we could react to countermesaures so that we could provide capabilities for theater and national missile defense that in order to keep a three-legged stool in the program, I had to protect each of the pieces.

As I looked for the $1 billion cut, there was no way that I could take the cut in one of the smaller pieces without emasculating that piece.

So I looked at theater missile defense. There I saw three very strong programs called core: the Patriot Advance Capability III, the Theater High-Altitude Area Defense System, and the Aegis Standard Missile II Block IV–A program.

The Bottom-Up Review had recommended two other programs for support at $18 billion. One was Naval upper tier and the other was the Corps SAM system.

The recommendation of the group was a start for the Naval upper tier of 1995. And a start for the Corps SAM program of 1998.

At the same time that the Bottom-Up Review was doing its work, the United States Air Force had also come in with a new candidate called Boost Phase Intercept and at the secret level ———.

All of our terminal systems which are represented by the core systems and in some instances the maritime systems are incapable of accessing the target as it is in the boost phase. So we had the Navy Upper Tier supported by the Bottom-Up Review and the boost phase system that was an input to the Bottom-Up Review.

The Joint Chiefs said if the concept works, it should have a higher priority than the other two systems. So what I was faced with was systems that promised significant advanced capability.

I had to take a $1 billion cut. I looked at the Naval Upper Tier Program and I felt that it was not yet ready to enter the acquisition phase.

We were in the process of assessing alternatives for naval upper tier. There were at least three alternatives that the Navy and we were looking at.

Based upon that, I decided to take the $1 billion out of that first major new start to have an assessment of the three concepts available in the time frame that would allow the start in 1998 of a new system. That is the program we are on now, sir.

Mr. DICKS. So you have slowed down the Navy program?

General O'NEILL. I have not funded the start of a major defense acquisition program until FY98 for which Naval Upper Tier is under consideration.

THEATER MISSILE DEFENSE

Mr. DICKS. So we are going to do research on those three? Is that correct?

General O'NEILL. Let me, if I can, clarify a little bit because the programs are very different. The Corps SAM program has been through concept definition. It was ready last summer for a Milestone One decision to enter acquisition. We were asked in achieving a cooperative R&D program with at least one of our allies in Corps SAM. That had not yet come to fruition so we are in the process now of putting together a cooperative R&D program in the Corps SAM area and that is essential to see Corps SAM needs to be resourced in the outyears.

The Naval Upper Tier will be completing a proof of principle technology program hopefully in 1994 where we will test-fire an interceptor off a cruiser on a carrier missile against targets at least twice and see if in principle the concept will work. The Navy is also looking at the THAAD.

In the area of boost phase, we are starting a research program in boost phase, which is budgeted in the advanced technology part of the BMDO budget and not in TMD.

Mr. DICKS. Now, you showed me this chart yesterday on theater missile defense, which included Corps SAM, sea-based TMD, and wide interceptor boost phase intercept. Is it correct you are going to pick one of these three in 1998 to go forward?

General O'NEILL. We are funded now to support one of those in acquisition. I don't mean to suggest that there aren't ways that we could accommodate potentially more than one. For example, if we decide that THAAD is a reasonable alternative for the Navy to look at for the Upper Tier, we could probably get that plus one of the other two at the lower dollar figure, but if we were to decide that each would be an independent, major defense acquisition program separate from the other programs like Aegis, Patriot, and THAAD, then we would have to allocate resources and could only support one.

Mr. DICKS. The Bottom-Up Review concluded that of the three theater missile defense programs being assessed for the future—

Navy Upper Tier, Army Corps SAM, and Air Force Boost Phase Intercept, that the Navy Upper Tier should be pursued as a major acquisition first.

Has that priority changed?

General O'NEILL. Yes, Sir.

Mr. DICKS. When will the decision be made?

General O'NEILL. Probably in late 1997 for a start in 1998. We have moneys in 1998 to begin demonstration validation. There is plenty of work to do between now and then looking at the concepts and assessing alternatives.

In the boost phase, there is a major research program that has to be conducted to make sure it is feasible.

Mr. DICKS. You are requesting $61.1 million for the boost phase concept, but only $17.7 million for the Navy Upper Tier?

General O'NEILL. Yes, sir.

Mr. DICKS. Is that adequate?

General O'NEILL. For the purpose that we are intending, Yes.

Mr. DICKS. What are you asking for the Corps SAM?

General O'NEILL. Approximately the same, $17.7 million for Corps SAM, about $17.7 million for Navy Upper Tier, and the $61.1 million for the boost phase is in the advanced technology part of our program.

Mr. DICKS. So it isn't coming out of theater missile?

General O'NEILL. No. The $61 million is coming out of the advanced technology part of our program that was budgeted in the Bottom-Up Review at $3 billion over the FYDP.

ABM TREATY COMPLIANCE

Mr. DICKS. DOD is studying the ABM Treaty. Specifically, addressing strategic defense, it also has implications for multi-mode missile, extended range interceptor missile, the ground-based radar, theater high altitude area defense, or THAAD, and Brilliant Eyes, which are complete. Were any of these systems found to be non-treaty compliant?

General O'NEILL. Mr. Chairman, when we submitted the paper on the THAAD program, we stated that it is the position of this administration that the THAAD, if it were cued by a space-based sensor, would have to be considered as an ABM system when it went to field testing.

For that reason, the administration is now in the process of clarifying with the Russians and other potential successors to the ABM Treaty the demarcation between what is a theater-class ballistic missile and what is a strategic class ballistic missile for the purpose of the treaty.

Mr. DICKS. If it were a strategic class, it would violate the ABM agreement because you have a space-based radar.

General O'NEILL. The issue would be if it were a strategic class ballistic missile defense system and would be mobile, with THAAD is designed to be, the THAAD is designed to be a mobile, ground-based system and mobile ground-based systems that are strategic defense systems are precluded by the treaty.

Mr. DICKS. It has to be at a fixed site?

General O'NEILL. A fixed-single site right now.

Mr. DICKS. How far are we going to go with THAAD until we get this figured out?

General O'NEILL. Sir, we are in the process of preparing the administration's position which will be coordinated with the Congress for the next round of the Standing Consultative Committee which will begin the end of this month in Geneva.

Mr. DICKS. How much do you have in the budget for THAAD?

General O'NEILL. For THAAD, $495 million in the budget.

Mr. DICKS. If you can't do this because it is nontreaty compliant, isn't that a hell of a lot of money to be spending on it?

General O'NEILL. Yes, Sir.

If I can clarify the position right now with regard to THAAD——

Mr. DICKS. Are you going to attempt to get an amendment to the ABM agreement? I think you would run into some very serious problems with that.

General O'NEILL. Mr. Chairman, we aren't—we haven't determined in our consultations yet with the Congress whether an amendment would be required or whether a statement that the parties recognize for example, that this is not an ABM system would be sufficient. But what we would like to do is have enough of a demarcation identified between our TMD systems, which are not supposed to be limited by the ABM Treaty and ABM systems that it is very clear which is which and our TMD program can proceed unfettered.

Mr. DICKS. When do you think you will know whether there is a violation or not?

General O'NEILL. We—again, until we have clarified the demarcation, the THAAD is considered to be an ABM system. If I may mention something in the—based upon the fact we are in a closed meeting, the United States position in the negotiations with the treaty partners and the Russian position both enable THAAD.

The Russians, in the negotiations, are very much aware of the theater threat. They have accepted the threat of a 3,000-kilometer system. That threat translates into the kind of technology that only a THAAD can accommodate.

The Russian position endorses that, adds some other qualifications on the position that the U.S. has, but in no case is ThAAD precluded in the ongoing discussions that have gone on so far.

If we stopped the negotiations today and accepted the Russian position, THAAD would be fully acceptable.

Mr. DICKS. Do you think you can work this out with the Russians?

General O'NEILL. Yes, sir. I am optimistic.

RELEASE OF THAAD FUNDS

Mr. DICKS. Congress directed DOD to not obligate more than half of its fiscal year 1994 theater missile defense budget until outstanding treaty compliance issues are addressed.

BMDO has been granted permission to spend all its THAAD funds, although negotiations are ongoing with the Russians to clarify the treaty regarding THAAD. Why were the funds released before this issue was resolved? Was there prior congressional approval of that?

General O'NEILL. Sir, I think—I could have some clarification, but I think the direction in the law as that the administration provide Congress with the—a study of the treaty issues with regard to each one of these systems before moving forward, and I think what our report said was that although the issues have been raised in the administration, there is no reason in 1994 to stop the program, because there is no concern about the treaty because we have not begun field testing.

So until the field testing part of the program begins, there isn't a concern. That is why the funding was released by the Secretary.

If it were a 1994 issue, then we would have had a problem with the funding being released.

Mr. DICKS. Was there language or not? Are we wrong on that? Did Congress say don't obligate half of your theater missile defense budget until outstanding treaty issues are addressed?

General O'NEILL. We addressed them. Yes, sir, and we said that in 1994, there is no problem.

Mr. DICKS. You have complied with the law because you have addressed the issue?

General O'NEILL. Yes, sir. We have addressed the issue.

Mr. DICKS. When will the remaining two planned studies on Navy Lower Tier systems be complete?

General O'NEILL. Sir, my understanding is that those studies are in coordination at this time. I would think they would be completed long before the requirement for the 50 percent has been reached.

Mr. DICKS. Are you looking at Navy Upper Tier, Corps SAM and boost phase in terms of treaty compliance?

General O'NEILL. Yes, sir.

Mr. DICKS. Has that already been done?

General O'NEILL. It is in the process right now. Yes, sir.

Mr. DICKS. Mr. Wilson? I think Mr. Wilson is very interested in ERINT. Am I in error?

Mr. WILSON. Mr. Chairman, if it is all right with you, I will yield to Mr. Visclosky and come back.

Mr. DICKS. Mr. Visclosky?

Mr. VISCLOSKY. Thank you. I am fine right now, Mr. Chairman. Thanks.

Mr. DICKS. Then, Mr. Wilson, you are such a gentleman, you may proceed.

Mr. WILSON. Thank you.

General O'Neill, it is nice to see you.

ERINT TEST

Mr. DICKS. Will the gentleman yield?

Have you seen General O'Neill's tape of the ERINT intercept?

Mr. WILSON. I have not.

Mr. DICKS. Did you bring your tape?

General O'NEILL. Yes, we did, sir.

Mr. DICKS. Since Mr. Murtha isn't here, bring the tape up. I want Mr. Wilson to see this. General, do you want to come up here and explain this to Mr. Wilson who has a deep and abiding interest.

Mr. WILSON. This was a test made after the choice?

General O'NEILL. This was the latest test. It was against a simulated unitary chemical warhead at White Sands against a target which we have defined and designed like the SS–21, about 100-kilometer range.

We are firing from the north end of the range in this direction. It is a hit-to-kill weapon and does not have a warhead aboard.

This is guided Test Flight No. 3. The second, third, were successes.

Mr. DICKS. The first test was not successful?

General O'NEILL. One became unstable two seconds out and didn't engage the target. These are the objectives, fire control computer performance, operation to target, performance with a radar seeker in the nose of the missile. It is a homing system launched into an area and then it kills what is there.

The anti-chemical warhead experiment—the idea is to be lethal and to make sure the chemical doesn't get to the ground. One of the important things about ERINT, which really underscores its capability is it is highly lethal because it puts all its energy into the target. It drives into it as hard as it can.

Maneuvering—you will see it engage. Those puffs of smoke are maneuvers. First are views of the interceptor and then views of the target.

That is a maneuver, another maneuver. Those little puffs of smoke are maneuvers. Here comes the target. A lot of maneuvers. He is trying to get into position. He has to maneuver more. He maneuvers and here is this chemical here.

You don't want it to go this way. This stops and disburses the clouds of chemicals, all the energy——

Mr. DICKS. They actually physically hit each other?

General O'NEILL. Yes.

Here are the motor burns. There is another motor burn, another motor burn. Here comes the target from the top. The motor's burning; stops burning. This system can make about 200 maneuvers. It has 200 thrusters for more, but it can make that number of maneuvers before it runs out of gas.

It had plenty of residual capability to keep maneuvering.

Mr. DICKS. I think that basically does it.

General O'NEILL. This is the third one of the interceptors maneuvering. Then you will see the views of the target.

The target is supposed to be about a thousand-kilogram warhead that looks like a SCUD.

The next set has what the target looks like. These are cameras tracking the target. Here is the target flying along minding its own business and then it is history.

You see a little bit of debris going forward, but not enough to make a heck of a difference. The altitude was about 15 kilometers, 45,000 feet.

The engagement is 15 kilometers down range and 15 kilometers altitude.

Mr. DICKS. Did the other system not hit the target?

General O'NEILL. It explodes in the vicinity and fragments go into the target.

Mr. DICKS. So the problem is that chemicals get to the ground whether they are being destroyed and eliminated—that is the term.

Mr. Wilson.

Mr. WILSON. General, it is always good to see you. Mr. Dicks told me I could have 10 or 12 minutes but if that is going to inconvenience Mr. Livingston——

Mr. LIVINGSTON. No.

PAC–3 DECISION

Mr. WILSON. General O'Neill, I am always glad to see you. General O'Neill has kind of a strange way of communicating with people, but he developed this at Rice University. He went to Rice. Not many of us were able to get into Rice, so we understand that Rice graduates are a little different from the rest of us.

General, I don't know where to start, but I do want to make a point to the other members of the Committee here, that for three years, this Committee, under a great deal of pressure from the competitor of ERINT, insisted on a level playing field, and rebuffed the efforts of others who wanted to go into a premature engineering manufacturing phase.

What was that, General?

General O'NEILL. Well, we felt that before we——

Mr. DICKS. Clarify this. Were these two separate programs?

General O'NEILL. Yes, sir, they were two separate programs. One was an evolution of the Patriot. ERINT was a technology program in the old SDIO. We went from our organization up to OSD and suggested that both of these programs should move forward, and it was the discipline of affordability that said, you are going to have—you and the Army are going to have to make a tough decision and decide which one of these you want more. That is what we were doing.

The idea to move into engineering and manufacturing development before we had done the necessary proof of principal testing was the issue that Mr. Wilson has brought up, and we demanded that successful testing be conducted before we make that important a decision. That is why the decision is made now rather than about six or seven months ago.

Mr. WILSON. For the last three or four years, this committee was meticulous in maintaining a level playing field between these two.

General O'NEILL. Yes, sir.

PAC–3 COMPETITION FAIRNESS

Mr. WILSON. The Chairman sort of gave me the assignment of making sure it was fair, but we had meticulously fully funded both contractors and both concepts. And then last year one of the manufacturers, who had a little less problem than a direct hit with a proximity fuse, attempted, not much in this subcommittee, but in the authorization committee, for the Congress to insist on a premature engineering-manufacturing development which would have given an advantage to one of the contractors.

Do you remember that, General?

General O'NEILL. Yes, sir. There was a discussion about whether we should make——

Mr. WILSON. There were amendments offered in the R&D subcommittee of the Armed Services Committee to insist that the Army go into engineering, manufacturing and development before your shop was ready or before the Army was ready. Fortunately, we were able to forestall that.

Everybody in the community felt that the other system was going to win, the competition, not having the problem that ERINT had—because the other system didn't have to hit to kill. But we were steadfast on this committee; we said that the Army would make the decision when they were ready to make the decision and not before.

I was totally convinced that the other system was going to win. There was no one as surprised as I was when ERINT was chosen. This hit that the General just showed us—and Mr. Chairman, I lied; I hate to tell you that. I had already seen it, but I wanted everybody else to see it. The only way I knew how to do that was to lie, so I did. But it was a little white lie.

And I have told the committee the funny story about how the Army gave me such misinformation—coming in and telling me we know you have done your best on ERINT, but we want you to know it has been a level playing field, and we have been totally fair; and furthermore, we are going to do some nice things for ATACMS. General O'Neill wasn't there, and I knew that General O'Neill thought ERINT was a pretty good system, so I said, Does General O'Neill agree with this? They said, Yes. I said, Does he agree with your decision? They said, Yes he does.

General O'NEILL called me and said, This has been a level playing field and a totally fair decision. He said, furthermore, no matter how this decision goes, you have $40 or $50 million in there, and the ERINT system is going to get to continue their research and development even if the decision goes against them. I said—General,—I can't use the words I used, but I said,—Why are you telling me this if you are not telling me we lost?—He said,—I want you to know it is a level playing field.

I was the most surprised person in the United States, because I had been the subject of a massive disinformation scheme of the United States Army. Now ERINT has been chosen, and General——

PAC–3 DECISION REVIEW

Mr. DICKS. Let's get this clear. As I understand it now, the decision that was reached is now being reviewed by an independent panel that Mr. Deutch has put into place.

Mr. WILSON. That is my point.

Mr. DICKS. I didn't know if the gentleman knew that. I assume that the gentleman did know that.

Mr. WILSON. The gentleman did know that, and I would like to have some explanation and clarification.

Mr. DICKS. This is the panel to make the Army's first decision the final decision.

Mr. WILSON. That is right.

Mr. DICKS. The disinformation campaign.

Mr. WILSON. That is right. What has happened now—and it is not a subject of great worry to me, because I have great faith in the integrity of the people who are making the decision, and I understand that the ERINT decision was a unanimous decision by the board—what was it—what exact judgment group was it that chose ERINT, General?

General O'NEILL. Sir, it was a recommendation that came up from the Army, so I would attribute the recommendation to the Army Acquisition Executive who was Mr. George Dausman. It came to him from a group of experts, which includes members of my staff—Admiral West, who is sitting to my rear, was a member of that group. It was a group of Army, Navy, military and civilian servants, a group that was not tied to the ERINT-Patriot program, but a group across the whole scope. They assessed the program and decided that ERINT was the—was the one the Army needed and the one that we needed.

Mr. WILSON. Are you in a position to say that it was a unanimous decision, or is that something you are not authorized to say? I know it was, but can you say——

General O'NEILL. It was announced as unanimous, yes, sir.

Mr. WILSON. And then Raytheon protested and the New England delegation protested violently and wrote a letter to, I presume, the Secretary of Defense and asked that this decision, which was a unanimous decision by the proper board and the armed forces, be reviewed by an independent agency regarding the ability of ERINT to deal with cluttered cruise missile attack; is that close to being right?

General O'NEILL. Sir, what occurred when the recommendation went forward, there were some very difficult technical questions asked. As a result of the——

Mr. WILSON. By whom?

General O'NEILL. By the OSD staff, by Mr. Deutch and others, that we frankly didn't do a good job of answering. And that was the fundamental basis. There was a lot of noise occurring, but that was the fundamental basis for Mr. Deutch asking me whether we had to have a decision now or do we have some time to look at it in the light of someone else's perspective.

I said, We don't have to make the decision today.

For that reason, he said, Let's have a group look at it one more time. It is too important a decision to be left to a scenario where you don't answer these questions with specific, hard, technical answers.

And so we have been—we have been in the process of allowing this group, this independent group, to look at the data that we had to make our decision, making sure it was sufficient, accurate, the models and simulations were accurate, and they have interviewed the people who participated, the users. And they will make their announcement and their out-brief to Mr. Deutch very shortly.

Mr. WILSON. When would you say, in two weeks or a month?

General O'NEILL. Yes, sir, it is a very short time. I would think within the next couple of weeks we would have the final decision.

Mr. WILSON. Mr. Deutch has not been confirmed yet by the Senate?

General O'NEILL. He has been confirmed as the Deputy Secretary of Defense last Friday.

INDEPENDENT REVIEW GROUP

Mr. WILSON. Of course, because everybody thought that when the Army board made the decision, that that was going to be it, and nobody was more surprised than I.

Who is this independent group reviewing this?

General O'NEILL. The independent group reports to Mr. Deutch. I think I can mention the name of the chairman of the group, Larry Welch, the president of the Institute of Defense Analysis and former Chief of Staff of the Air Force.

Mr. WILSON. Are these people civilians?

General O'NEILL. Yes, sir, outside the government and outside the Army, very highly qualified people, responsible, excellent of——

Mr. WILSON. How were they chosen?

General O'NEILL. I am not sure, sir. I can find that out for you.

Mr. DICKS. Mr. Deutch chose them, I think.

General O'NEILL. I think Mr. Deutch picked them, yes.

Mr. WILSON. I hope it is not overweighted from Harvard and MIT.

General O'NEILL. Not to my knowledge, sir, no.

Mr. WILSON. And this group is charged with determining if ERINT is satisfactory against cruise missiles coming in that cluttered environment and one other thing.

General O'NEILL. This group is looking across the whole spectrum of requirements for this advanced capability, which includes performance against cruise missiles, includes performance against tactical ballistic missiles and air-breathing targets; and the question is, with limited resources, what alternative of the two does the Army need most? And they are reviewing the decision that was made by the senior review council for Mr. Dausman.

The senior review council made a recommendation that was coordinated with me, with Mr. Deutch and with others before it was announced. We are just reviewing that recommendation.

Mr. WILSON. Would there have been a review had it not been for the letter from Senator Kennedy and the rest of the New England delegation?

General O'NEILL. I can't say one way or the other.

Mr. WILSON. Is this customary, after the Army has made its recommendation to the DAB, to have a civilian review board?

General O'NEILL. It is not customary——

Mr. WILSON. Has it ever been done before?

General O'NEILL. I think it has. We will research it and give you the specifics. In my recollection, it has been done.

Mr. WILSON. I don't think so.

General O'NEILL. It sometimes is done, I think, because of the financial commitments. That is made, and the fact that before you make this commitment, you want to be darn sure that you have made the right decision.

[The information follows:]

There have been a number of cases where independent committees or groups have reviewed decisions, plans, or allegations related to DoD major acquisition programs. A brief discussion of several examples of these reviews follows:

Two previous studies of the Patriot program were conducted after the program had already entered Full-Scale Engineering Development in 1976 and had started a major Pre-Planned Product Improvement (P3I) program in 1982.

In April 1985 the Army commissioned Bell Telephone Laboratories to conduct a review of the requirement for an Anti-tactical ballistic missile capability. The report recommended changing the Patriot's explosive warhead and pellets to hit-to-kill technology.

In December 1986 an Applied Physics Laboratory (APL) study initiated by the Army challenged the Bell study. The APL study concluded that the Bell team had made errors in their analysis that caused underestimation of the PAC–2 system's probable lethality against tactical ballistic missiles. At a meeting of the two study groups the Bell representatives essentially acknowledged the correctness of the APL findings.

OSD has conducted several independent assessments of other DoD acquisition programs. These assessments center around either the system acquisition plans or whether the projected performance capabilities of a specific system meet operational requirements. Among these assessments are:

a. The Defense Science Board (DSB) conducted a review of the B–2 in February 1991. This assessment examined the first 12 hours of test data and found no major problems during the B–2's early stealth flights that would prevent the B–2 from evading enemy radar.

b. OSD conducted a technical review on Longbow during February 1992. The Army requested approval to ease requirements for Longbow's stationary target spotting capability. As a result of a technical, schedule, and cost review, the Conventional Systems Committee approved Army plans to ease the performance requirements for the armor-hunting, helicopter-mounted Longbow system.

c. The National Academy of Sciences reviewed the Air Force Space plans during March 1992. This review centered on the National Launch System program jointly funded by DoD and NASA. The program sought to develop a family of launch vehicles for orbiting both civilian and military payloads. The National Research Council's Aeronautic and Space Engineering Board disagreed with the Air Force's acquisition plan to develop three launchers with different payload capabilities. The study recommended building the smallest launch vehicle first rather than last to maximize learning at lowest cost and continue questioning the need for larger vehicles.

d. The DSB reviewed Tactical Aircraft in February 1993. The DSB was tasked by Congress in the FY 93 Defense Authorization Act to assess the technical risks of the Air Force F–22 and Navy F/A–18E/F development programs. The review found the F–22 to have higher technical risks than the F/A–18E/F. Risk areas were clearly identified for both programs and the risks were deemed to be adequately managed. The DSB pointed out that full funding of both aircraft was required through Engineering & Manufacturing Development if program milestones and technical risk reductions were to be achieved. The DSB stated it was too early to make judgment on a common multi-role aircraft. The report further concluded that disrupting the F/A–18E/F development program for building prototypes was not justified.

e. A number of independent agency reviews were conducted on the C–17 program. A DoD Mobility Requirements Study in February 1992 reaffirmed the need for the C–17. The National Academy of Science Study in January 1993 reviewed Air Force plans for live fire testing of the C–17. Also in January 1993, a DoD IG report revealed improper payment and contracting on the C–17. The DSB was tasked by the USD(A) in May 1993 to assess contractors' capability to successfully complete C–17 development and transition to production and to identify changes necessary to ensure success and reduce risk.

f. The National Academy of Sciences reported to Congress on June 25, 1986 on the initiation of live fire tests on the Bradley Fighting Vehicle. Tests had been halted when allegations were made that the test had been rigged. As a result of some questions in testing techniques raised by the report, the Army requested the National Academy of Sciences Committee on Vulnerability Analysis develop a detailed test plan for the resumption of live fire tests.

Mr. DICKS. I think the General said that there were some technical questions raised about——

General O'NEILL. Yes, sir.

Mr. DICKS. Whether a number of specifics that were supposed to be satisfied, and some serious questions have been raised about whether, in fact, that had been satisfied.

General O'NEILL. Yes, sir.

Mr. DICKS. That is why I think there may have been some reason for asking for this. I think it cleared the air, frankly.

Mr. WILSON. You were here when the Secretary of the Army was very strong in his statement that he had watched this very closely and signed off on this himself.

Mr. DICKS. Yes.

General O'NEILL. Yes, sir.

Mr. WILSON. I think when you do your research you will find that personally I think the civilian review is unusual, a little exotic, and has not been done before, certainly on anything of this magnitude. I am not really complaining because I think that ERINT is going to triumph anyway, but I want to point out that it is an unusual procedure and, in addition, I expect Raytheon to protest, to go to court, to do all those things that are possible and I want the committee to sort of be aware of the extent to which the people in the military want to make this decision and that this is going to be a very, very protested decision all the way along.

I have told Raytheon before the decision when I thought they were going to win, that if they won, I would be their best friend, because I think this is the most important battlefield requirement that we have in the Army. I am kind of sorry that they are making such a big deal out of it. I think it would be more constructive—let me say one more thing. And I thank the chairman for the excessive time, but there is a lot in here for Raytheon because of the launchers and everything else.

I think it would be a very constructive thing just to allow the process to proceed. But apparently that is not the case. I just want the committee to be aware of the nuances that I know about. I thank the chairman very much.

Mr. DICKS. Mr. McDade.

NATIONAL MISSILE DEFENSE

Mr. MCDADE. Thank you Mr. Chairman.

Welcome, General, Let's focus on the National Missile Defense System which, as we understand it, is intended to protect the continental United States against a ballistic missile attack. We understand that without modification of the ABM Treaty, the initial deployment would have to be a hundred ground-based interceptors in Grand Forks, North Dakota; is that correct?

General O'NEILL. Yes, sir.

Mr. MCDADE. The Bottom-Up Review calls for a $600 million per year technology base program rather than an acquisition program; is that accurate?

General O'NEILL. Yes, sir.

Mr. MCDADE. Tell us your new strategy for the national defense program.

General O'NEILL. The phrase is technology readiness. What that means is, based upon the fact that we don't have a likely overt threat, there is—there are weapons in the hands of the Russians, the Ukrainians, the Chinese. The intelligence community suggests that these are highly unlikely threats to the United States. What we are looking at is the emergency of a threat potentially from the rest of the world, that is other countries, and the time line for that.

Mr. Woolsey last year in his confirmation hearing said he wasn't sure whether it was eight years or ten years or 15 years but it is in that time domain unless those Nations somehow can buy or otherwise obtain missile materials and the missiles.

So what that says in the technology readiness program is that your horizon can be set based upon the threat out about ten years or so. That horizon is the time when you would probably have to deploy a system. So what we have is a program that is dollar limited, that is pushing across fronts.

The first front is the interceptor, the actual weapon that shoots down this strategic nuclear weapon. The second is the sensor, that is the eyes and ears as it were of the system. Third is the battle management command and control for the system; that is coordinating it; and fourth is what we call the integration technologies, how you put the three above together so that they function in a reasonable way.

So we have programs in these four domains. In these four domains, my direction to my staff is I want to be able to respond if we find out tomorrow that one of these rest-of-the-world countries has bought an ICBM or has somehow put together a rudimentary form of ICBM.

What it means is that we would not have early the ultimate capability but we would have some capability and could utilize things such as our DSP program to warn us that something is coming and tell us the general direction of the threat.

We have battle management, command and control and communications systems that exist for the warning to the National Command Authority that there is an attack coming, so we can add some technology to that to do more than just tell us there is an attack coming.

It can also tell us where it is coming from, how large it is and what coordinates it is at. By working on interceptor technologies and programs like LEAP, (that is something that is going to be tested for Navy upper tier in theater) and THAAD, (a system that is a TMD system but it has to engage targets exoatmospherically). So some of the technologies from THAAD are applicable.

We can leverage those technologies together with the technologies we determine are uniquely strategic, like trying to pick out some clutter when the RV of a strategic object has associated things with it. That is something that we would be looking for with strategic systems.

We can, as a function of time, be in a position to do a capability if the need arises and we talk about a series of events that we call epochs and as we achieve each of these particular epochs, we can have a better capability in a shorter time that can do something meaningful against a particular kind of a threat. After the ten-year period, we would have evolved to our optimal system which would be a ground-based interceptor like the one we testified about last year; a BMC3 system that is efficient, cost-effective, and responsible to the kinds of threat that we envision in the long term; and a sensor in space, a Brilliant Eyes space and missile tracking system that can tell us very accurately at any instant where that enemy system is.

That is the strategy that we are going to try to undertake but we don't have a dollar in that strategy to actually develop or deploy anything.

Mr. McDade. Would you tell us—you say you are going to have three main phases of your technology efforts, how much would you shorten the time to develop a system once you hit the three main epochs?

General O'Neill. The time it would take at the end of each one of the epochs to deploy would be a function of resources of course, a function of how much quickly we could go through a nominal acquisition program.

The nominal acquisition program, as you probably know, is typically three years for DEM/VAL, three years for engineering manufacturing development and three years for production.

Well, if we have a threat hanging over our head, we are not going to wait for nine years to get a capability in the field. I would project that we could do, at the end of each epoch, a development within about three to five years. But we would be deploying——

Mr. McDade. You are talking about cutting the time in half, right?

General O'Neill. Yes sir.

Mr. McDade. If you had no technology program, how long would it take you to get through the whole thing? Is the answer just the ten years, or is it longer?

General O'Neill. The answer is approximately ten years, starting from zero, as I am assuming we have high technical risk, because we haven't done anything.

Mr. McDade. If we put in the technology program and appropriate the money you want and stay the course, you are saying you are shortening that time about in half?

General O'Neill. Yes, sir.

Mr. McDade. Depending, of course, on resources, at cetera. But you would have, in your opinion, the capability to cut it in half; is that right?

General O'Neill. Yes, sir.

Mr. McDade. What parts of the country will be unprotected by a single ABM treaty compliance site?

General O'Neill. Sir, that is a very difficult question, because I don't know what threat and what time frame you are talking about. Ultimately, we would like to be able to protect, and it is feasible, if we have the technologies that mature in about ten years, to protect the whole U.S. from a single site, or the whole continental—excuse me—the whole continental U.S.

Mr. McDade. Is that your goal in terms of——

General O'Neill. Yes, sir.

Mr. McDade. Would you tell us what countries have the ability to launch a ballistic missile at the U.S., or likely to have in the near future?

General O'Neill. Currently or in the near future, I would suggest, Russia, Ukraine, China and possibly India.

LIGHTWEIGHT EXOATMOSPHERIC PROJECTILE PROGRAM—LEAP

Mr. McDade. The interceptor that is being designed looks a lot to the uneducated like LEAP. Tell us how the interceptors are different, will you?

General O'Neill. The interceptor that is being designed for the strategic use is an interceptor that probably weighs three times what LEAP weighs. When we are talking about a static strategic missile defense system, we are not concerned so much about the weight of the launcher. So we can use a large booster; we don't have to worry about putting it on a cruiser or putting it on a mobile system because it can't be mobile and be treaty compliant, so as a result, we have much more sophisticated kill vehicle or front end, and the numbers that we throw around typically are 30 kilograms for a strategic front end or a kill vehicle, versus about 8 kilograms for LEAP. LEAP has to be packaged in a very small, confined package. We are looking at putting LEAP on a cruiser or an Arleigh Burke class destroyer in the vertical launch system which accommodates a Tomahawk or a standard missile, so LEAP is very small. LEAP was originally designed as a weapon that would be launched from a hyper-velocity gun, a rail gun, and the technologies have evolved to the point where they are now interesting to the theater people because they are small.

Mr. McDade. Really no comparison between the two systems.

General O'Neill. No, sir.

Mr. McDade. Okay. Thank you, Mr. Chairman.

Mr. Dicks. Mr. Darden.

Mr. Darden. I have no questions. I want to thank you very much for being here, General O'Neill, and I have talked to Dick West, but thank you very much for your testimony.

General O'Neill. Well, thank you very much, sir. It was a pleasure to send Dick West over to see you.

Mr. Livingston. Again, thank you for coming by yesterday. I would like to follow up on some of the Chairman's questions about the LEAP problem, Lightweight Exoatmospheric Projectile Upper Tier Program. As I understand it, you have indicated that that program is being reduced in fiscal year 1995 because the paperwork hasn't been complete, there is no proof of principle, no cost effective operational analysis; the program has not reached milestone zero or one stage. Meanwhile, THAAD, Theater High Altitude Area Defense Program and the Corps SAMs, surface to air missiles, and the boost phase intercept programs have had the paperwork completed and some analysis done. Now, I have to tell you, as you know, I have been a strong supporter of the entire missile defense system, the SDI effort, ever since it began.

NAVY THEATER MISSILE DEFENSE EFFORT

But I have also been one of the prime supporters of the Navy's theater missile defense effort, particularly the Upper Tier Program. I am concerned when you say that the Navy has not formally completed all of its requirements for the LEAP Upper Tier Program, especially when I compare the progress with some of the other efforts. In support of what I have to say, I would like to refer and incorporate in the record a January 10 to 16 article from the Defense News which talks about the Navy Theater Missile Defense Program. I will read to you just one paragraph which gives the flavor of the article. It says, "Navy and industry officials argue, however, that it is shortsighted to cut the estimated $2.5 billion upper tier program and embark on the far more comprehensive $10 billion THAAD Patriot and Corps surface to air missile alternatives. Completing the Upper Tier effort is relatively inexpensive. Navy and Defense industry sources argue, because the bulk of the costs to develop such a system have already been paid by the Navy's acquisition of cruisers equipped with Aegis radar and combat systems," General, I am told that the Navy has had a detailed program for a year. But when they had the opportunity to brief Mr. Deutch last year, the Navy plan was thrown out. No one from the Navy or the Navy program were able to present the plan, as I am told. I am not positive of that, but that is what I am told. The plan—the Navy plan was briefed by one OSD official and the meeting was halted after one question was asked and could not be answered. That does not appear to me to be an adequate presentation of the program. And, as a matter of fact, when you start comparing the LEAP to THAAD and Corps SAM or the Boost Phase intercept, it seems that you are talking about apples and oranges. On the one hand, you have a program that is already flying hardware, LEAP and upper tier, and you are comparing it to programs that are arguably mature, but still primarily exist on viewgraphs and in concept papers, that being Boost Phase and Corps SAM. Of course, THAAD has roughly reached milestones one, the phase in RTD&E programs when some hardware is built. Some THAAD hardware exists, but it has not been assembled, it has not been flown, and the first THAAD test scheduled for next September has been officially delayed for two months. I am told that the lead contractor engineer on the program has recently quit. THAAD only reached milestone one, even so, and then when you consider Corps SAM and the Boost Phase intercept programs, they are even further back. The Corps SAM and Boost Phase programs are strictly conceptual in nature, no hardware exists and they have not even reached a milestone one decision point, so I am told. But in LEAP Upper Tier Program, flight tests were flown last year with a large Navy Terrier missile to simulate what it will be like on the upgraded standard block VI missile. The actual LEAP projectile will be tested on a missile against targets this summer. And LEAP Upper Tier has certainly reached a milestone two phase where the extensive demonstration and validation tests are conducted with all of the actual hardware.

LEAP SPENDING

Now, the difference between milestone one and milestone two phases in the RDT&E world, I am told, is about two to three years, so that would put the Navy program two to three years ahead of any of the Army programs. We have requested—the requested spending for the LEAP program, $17.7 million in 1995 and the out years allows the program to slip so that the new, untested Corps SAM and Boost Phase intercept program can catch up. And while Corps SAM has a funding profile similar to LEAP Upper Tier, the

Boost Phase intercept program has been significantly increased from $16.4 million in fiscal year 1994 to $61.1 million in fiscal year 1995, and higher in the out years. Budget documents indicate that even the Arrow program, the Arrow program, which you told me yesterday is wholly unusable for our purposes for ballistic missile defense is funded at a higher level than the LEAP Upper Tier Program, but its last test was aborted because of malfunctions in ground-based electronics, and it is solely incompatible, as I say, for U.S. defense. This subcommittee recently went to South Korea, talked to them about their ballistic missile defense needs. General Luck, our commander in South Korea, said that after our visit he wanted the Patriot missiles deployed, but the South Korean Government has essentially vetoed that request and we were caught in a too-late situation, a situation, though, that I think points out how important sea-based theater missile defense is.

It would seem that that could really answer the needs of the South Koreans should they need it, and we hope that they don't. But a sea-based system can provide the defensive umbrella for our troops now, as it is not contingent on the approval of foreign governments. So I ask you, doesn't this situation and similar ones in the future make for a forceful argument for accelerating or restoring the Navy programs as opposed to cutting the funding and letting them slip?

Mr. DICKS. I think you set a record for the longest question.

Mr. LIVINGSTON. A very serious question.

General O'NEILL. Well, it certainly is, and I will not argue with the Congressman. I think what he has said is basically correct in terms of the value of marinized BMD. It is a potentially powerful system. The issue is whether it should displace a part of the TMD core, a program that has been looked at by the Bottom-up Review, and they did not accept that. The program, the THAAD Program that you mentioned, is in acquisition. It will test this year. It is a program that we are staking a lot of our future on. That does not mean that the Navy Upper Tier Program is not just as important. It is just that the Navy Upper Tier Program, from my standpoint, is behind it in time. It is behind it in commitment.

Mr. DICKS. Behind THAAD?

General O'NEILL. Behind THAAD in time and in commitment. And we, as I said earlier, we and the Navy are not sure whether the solution is LEAP. The LEAP Program has existed for a long time, as I said, it was put together to provide a kill vehicle for a hyper-velocity gun, a rail gun. It is a technology program; it was never assumed from the ground work to be a system that would be a TMD system. It has evolved to the point where it is now being—the principle of LEAP is being tested on a marine platform because it is small, lightweight and very capable. I think if the tests this summer of the LEAP are successful, we have to take a very long, hard look at whether we have the right long-term program for Navy Upper Tier. I think you have an excellent point, sir.

Mr. LIVINGSTON. Well, I don't mean to press this issue too far, but I just have to tell you——

Mr. DICKS. Go ahead.

AVAILABILITY OF BALLISTIC MISSILE DEFENSE SYSTEM

Mr. LIVINGSTON. Okay. If you insist. I am concerned that, first of all, that we have the quickest, most readily available ballistic missile system that we can get, and a I know that you feel the same way. But I worry, number one, that we may be in the midst of an interagency not invented here problem, and I certainly hope that we are not faced with that kind of deal.

General O'NEILL. Would you like me, sir, to have Admiral West comment on the program?

He is my Deputy for TMD, and if you notice his uniform, sir, he is committed to naval material.

Mr. DICKS. Is he the one that couldn't answer the question at the meeting with Deutch?

General O'NEILL. No, sir. He was not yet onboard, as we say in the Army.

Mr. DICKS. I hope not.

Mr. LIVINGSTON. That would be fine.

Admiral West, I would like you to testify, but I would like to know how we know that THAAD is ahead of the Navy LEAP program when it has not been flown yet, has not ever been assembled yet.

Admiral WEST. Well, sir, I think the difference between THAAD and the Navy Upper tier, of course, is that THAAD is an acquisition program and has defined program cost risks and schedule as does the Navy Lower Tier, which we are working very hard on. I think the Navy Tier is a follow-on or next generation sea-based capability that we are looking at as a technology base.

This year there is $80 million involved in Navy Upper Tier, about $75 million involved with the LEAP test, and about five million going to complete test studies and other options for the Navy Upper Tier. But the difference between Navy Upper Tier and THAAD is, as a matter of fact, that THAAD is an acquisition program and Navy Upper Tier is not an acquisition program.

Mr. LIVINGSTON. Well, it seems to me that we have already gotten to phase two with the Navy program, doesn't it make sense to just kind of follow through at a more rapid pace with that, rather than trying to bring some of those other ones on line that aren't even nearly as far along as LEAP is.

General O'NEILL. Sir, as a professional acquisition person, I would not claim for a moment that Naval Upper Tier was ready for what you call milestone two, which is engineering development. What that means is that we have completed demonstration validation. We are ready to prototype the system. As I said earlier, the Navy has not decided whether LEAP is their chosen, most cost effective, operationally effective candidate. One of the problems you have with LEAP, sir, as it presently exists, is it has a floor at 100 kilometers. So guess what I would do if I was the adversary? I would fly under you. We have to look at that very hard. Now, THAAD does not have such a floor.

We have a program called Endo-LEAP, Endoatmospheric LEAP, which can function inside the atmosphere as well as above the atmosphere. But that program is significantly less mature than LEAP. It is a concept that has tremendous payoff. If I had been given $18 billion, I assure you I would have pushed and Dick would have pushed as hard as we could to get that program ready for acquisition starting in fiscal year 1995. But without the $18 billion in my program, there was no way I could see sacrificing another element of my program for the Navy Upper Tier.

ARROW PROGRAM

Mr. LIVINGSTON. Well, you have got to make your decision based on your priorities, and I appreciate that.

It concerns me. Another thing that concerns me is that from my information, it would appear that Arrow is getting as much funding as LEAP; is that correct?

General O'NEILL. Arrow is getting approximately $56 million. That has been a long-term commitment between the U.S. Government and the Government of Israel. We paid 72 percent of the cost of the Arrow follow-on program.

Mr. LIVINGSTON. All right.

Mr. DICKS. Excuse me for a second. Where does Arrow fit into all of this?

Mr. LIVINGSTON. It does not.

General O'NEILL. Arrow is a program that is a strategic defense program for Israel. It consists of a missile which we are helping them build, a radar which they are purchasing on their own from one of their contractors, and a battle management command control communications system, which will be part of the Israeli air defense net. We made an agreement to cooperate with them on development of the missile, because we felt it was in the U.S.'s interest to support their strategic defense, and also, that we could obtain useful R&D data from the development of Arrow. Of course, the contractor that builds the focal plane in the Arrow seeker is the same contractor who builds the seeker for THAAD. So that contractor went over to Israel several times over the last couple of years and assisted the Israelis in getting through testing, laboratory testing, table top testing, and then flight testing with a technology that they could then take back to the United States and decide whether it made any sense to put it into a U.S. system. This, I think, was of significant benefit to us. There are several other examples and I could make them.

Mr. LIVINGSTON. So as research payoffs, but the system itself does not feed into our system.

General O'NEILL. The system is too big, too heavy. It is a 3,000 kilogram missile right now. They are planning to cut the weight down, but even at the reduced weight, we can't get enough of them to the battle. So it does not fulfill any U.S. requirements.

Mr. LIVINGSTON. International agreements aside, if we are paying $56 million to the Israelis for Arrow and only $17 million for LEAP, and apparently LEAP is certainly as far along as Arrow is, wouldn't it make more sense from an American strategic point of view to take $20 million out of Arrow and put it into LEAP?

General O'NEILL. Yes, sir. I would like to mention to the Congressman that these numbers are in the law, they are fenced for expenditure on the Arrow program.

Of course, you can change that.

Mr. LIVINGSTON. We earmarked it last year.

General O'NEILL. Yes, sir.

Mr. LIVINGSTON. We haven't earmarked it this year.

General O'NEILL. No, sir. You have not.

Mr. LIVINGSTON. So if we didn't want to earmark it this year, or if we wanted to reduce it, we could increase LEAP and decrease Arrow.

General O'NEILL. Yes, sir.

Mr. LIVINGSTON. Thank you.

Mr. DICKS. Mr. Skeen.

Mr. LIVINGSTON. I have questions for the record, also.

[CLERK'S NOTE.—Questions submitted by Mr. Livingston and the answers thereto follow:]

BOTTOM UP REVIEW

Question. What did the Bottom-Up Review recommend regarding THAAD, Corps SAM and Boost Phase Intercept programs?

Answer. The Bottom-Up Review concluded that of the three theater missile defense programs being assessed for the future (Navy Upper Tier, Army Corps SAM, and Air Force Boost Phase Intercept), Navy Upper-Tier should be pursued as a major acquisition first, and Corps SAM should be initiated next. The Bottom-Up Review was conducted before the OSD review of the Boost Phase Intercept concept.

NAVY THEATER MISSILE DEFENSE

Question. Provide the exact amount by fiscal year of the reductions taken out of Navy theater missile defense (breakout lower and upper tier programs) as a result of the BUR reduction of $1.1 billion in Ballistic Missile Defense.

Answer.

A. Sea-Base Lower Tier (Dollars in Millions)—

(1) BMDO position prior to $1.1B reduction (October 1993): FY95, 193.0; FY96, 234.0; FY97, 239.0 FY 98, 268.0; FY99, 240.0; FY95–99, 1174.0.

(2) FY95 President's Budget (February 1994): FY95, 194.0; FY96, 251.5; FY97, 291.6; FY98, 292.3; FY98, 292.3; FY99, 254.1; FY95–99, 1283.5—Difference, +109.5.

B. Sea-Based Upper Tier (Dollars in Millions)—

(1) BMDO position prior to $1.1B reduction (October 1993): FY95, 154.6; FY96, 270.1, FY97, 285.1; FY98, 300.6, FY99, 321.7 FY95–99, 1332.1.

(2) FY95 President's Budget (February 1994): FY95, 17.7; FY96, 30.6, FY97, 33.4; FY98, 36.5, FY99, 39.1; FY95–99, 157.3—Difference, −1174.8.

NAVY UPPER TIER

Question. Provide the FY95 level of funding recommended for the Navy Upper Tier (sea based wide area) in last year's FY94 budget submission to Congress.

Answer. President Clinton's FY94 APB contained $298.86 million for Sea-based Upper Tier in FY95.

STANDARD MISSILE BLOCK IV UPGRADE

Question. What is the range projected for the LEAP system on the standard missile block IV upgrade? How does it compare to today's standard missile and the THAAD?

Answer. The exact performance characteristics are classified and can be provided in a classified forum. The SM-2 Block IVA has similar performance and battle space to PATRIOT (PAC–3). Because THAAD is designed as an overlay in support of the Army enclave operational concept, its performance is different from the LEAP with Standard Missile. Because the LEAP has been downsized to fit into the Standard Missile, we have space for the Advanced Solid Axial Stage (ASAS) rocket motor that adds range and performance.

Question. What is the status of the block IV upgrade for the standard missile?

Answer. The first in a series of risk mitigation flight tests is scheduled to fly at White Sands Missile Range in FY95. These flight tests incorporate many of the components intended for use in the objective missile. The flight tests are to demonstrate the integration of critical risk elements. During this flight testing, the seeker for the Block IVA will be integrated with Block IV airframe, booster and warhead to achieve the risk mitigation round dubbed SM–2 Block IVA. Missile risk mitigation for the SM–2 Block IVA has four major functional areas: subsystem and component integration testing (bench testing of components such as the seeker), arena and sled testing (measuring blast affects of warhead), analyses and lessons learned from PATRIOT and ERINT, in addition to flight testing.

THAAD/CORPS SAM/BPI MILESTONES

Question. Explain (no charts) for the record the actual analysis and milestones completed and current milestone schedule, by fiscal year [FY94–FY99], (including planned hardware tests) for the THAAD, Corps SAM, and Boost Phase Intercept programs.

Answer. The THAAD program is currently at the 19th month of the 48–month Dem/Val program. The program has completed all milestones to date in accordance with the milestone schedule approved at the Milestone I, held in Jan 92. The milestone schedule for the years requested is summarized below:

Milestone	*Schedule*
ATP for Dem/Val contract	4Q FY92 [1]
Initial Design Review for Dem/Val Prototype	2Q FY93 [1]
Final Design Review for Dem/Val Prototype	1Q FY94 [1]
Final Design Review Update for Dem/Val Prototype	3Q FY94
Begin Dem/Val Missile Flight Tests	1Q FY95
Begin Dem/Val System Flight Tests	4Q FY95
Complete Dem/Val Contract	4Q FY96
Milestone Decision Review II	4Q FY96
Deliver UOES Prototype System	1Q FY97
Begin EMD Phase	1Q FY97
Preliminary Design Review	3Q FY97
Critical Design Review	2Q FY99
Low Rate Initial Production	3Q FY99
Milestone Decision Review III	4Q FY01

[1] Milestones Completed on Schedule.

Boost Phase Intercept as a program is still in the formative stage. In FY93 several promising technology projects and concepts were evaluated in the BMDO BPI study. Currently, BMDO and the Air Force are responding to a USD(A&T) action to develop a joint BMDO/USAF/USN management plan for an air-launched kinetic energy BPI demonstration program. The plan is due to the OSD staff by the end of April 1994. A very preliminary milestone schedule is provided below:

Milestone	*Schedule*
BPI Demonstration Management Plan	3Q FY94
Begin Missile Captive Carry/Free-Flight Guidance Tests	(TBD)
Off-Board Sensor Cueing/Fire Control Demonstrations	(TBD)
First Hit-To-Kill Intercept Demonstration	4Q FY97

Corps SAM completed Milestone 0 in the 4th quarter of FY90. In FY98 the Department of Defense will make a decision to move one of the advance concept programs (Corps SAM, the Sea Based Wide-Area or Boost Phase Intercept Program) into formal acquisition. If Corps SAM is selected it will have a formal Milestone I decision in FY98. Corps SAM has completed contracts for Concept Definition Studies that resulted in several differing designs. Up to two Concept Development contracts will be awarded in FY95 to refine these concepts. A preliminary milestone schedule is provided below:

Milestone	*Schedule*
Concept definition studies contract award	3Q FY92
Concept definition studies completed (in-house and industry)	2Q FY93
Release RFP for concept development	3Q FY94
Concept development contract award	2Q FY95
Systems Requirements Review	3Q FY96
Milestone I review	4Q FY97
System development contract award [1]	1Q FY98
Preliminary Design Review [1]	1Q FY99

[1] If selected as the Advanced Capabilities Dem/Val Program.

Question. Provide for the record any schedule delays experienced to date in these programs and milestones.

Answer. The THAAD program has completed all scheduled milestones within the schedule approved at Milestone I. Several contractor-controlled milestones have slipped slightly due to normal risks and development problems typical of a complex weapon system such as THAAD. These delays may result in some delay in the first missile flight test. Such delays should not impact the overall program milestones.

The Boost Phase Intercept program is formative, and has yet to establish program milestones.

Corps SAM has not experienced any delays in its Milestones. The BUR recommended postponement of the Milestone I decision to FY98 due to limitations in funding.

"MARINIZED" THAAD

Question. Have COEAs or proof of principle testing or analysis been completed on a "marinized" THAAD?

Answer. Before the Initial Design Review (IDR) for approval of the Theater High Altitude Area Defense (THAAD) missile system baseline design, a study was completed that investigated the compatibility of the THAAD missile, or Navy THAAD variant ("Marinized" THAAD), with the existing AEGIS and Vertical

Launch Systems. Entitled the THAAD-AEGIS Compatibility Study, this analysis defined design, performance and cost impacts on the baseline Army THAAD program to meet Navy requirements. The ultimate goal was to investigate the feasibility of designing a joint service missile for area defense against theater ballistic missiles.

The major study findings were:

Building a totally common THAAD missile for joint Army-Navy use would significantly degrade Army THAAD performance and is impractical;

The THAAD missile, as described by the original baseline design, can be "marinized" to be mechanically and electronically compatible with the AEGIS Weapon System (AWS);

Performance analysis of a "Marinized" THAAD missile used with a modified AEGIS/SPY–1B radar shows a sea-based TBMD capability can be achieved that is comparable to a land-based THAAD system; and

Integration of the "Marinized" THAAD missile into the AWS involves several significant technical issues and requires substantial additional system engineering and analysis.

An effort is currently underway to resolve these technical issues and assess the impact on the ship systems of the potential solutions.

[CLERK'S NOTE.—End of questions submitted to Mr. Livingston.]

BRILLIANT EYES

Mr. SKEEN. Thank you, Mr. Chairman.

It is real good to see you again, General. Welcome. Let me move to Brilliant Eyes and this program of interceptors and space-based satellites. For fiscal year 1995, the request was for $120 million.

General O'NEILL. Yes, sir.

Mr. SKEEN. The Bottom-Up Review suggested $200 million per year for those programs. Why isn't the request for Brilliant Eyes any higher than it is?

General O'NEILL. Sir, last year the Congress asked the administration and the Secretary to look at the set of satellite IR sensor programs, including the DSP, and the FEWS.

Mr. SKEEN. These are infrared.

General O'NEILL. These are passive infrared satellite systems—and the Congress asked for the Secretary to evaluate those programs and come up with a cost effective layout of what the investment should be in each or elimination of one or more.

As a result of that activity, it was decided that the funding for Brilliant Eyes would be reduced, and that funding is now compatible with the Technology Readiness Program that we find ourselves in in the national missile defense area.

Mr. SKEEN. So with another $80 million, you really haven't got—the $120 million will be sufficient for what you are doing now?

General O'NEILL. When we were told that our funding was $120 million, we decided to incorporate that the only way we knew how, and that was to reduce the competition. So what we have done is we have eliminated the competition in a development program from two contractors to one. The problem with that is increased risk. So if we had additional resources, what I would do is reinstate the competition in the program. But right now we are going with a $120 million per year single contractor.

Mr. SKEEN. Which contractor is that?

General O'NEILL. It has not yet been determined, sir.

Contractors right now are—it is a Rockwell, or TRW decision, and we have to make that decision.

Mr. DICKS. On Brilliant Eyes?

General O'NEILL. On Brilliant Eyes.

Mr. SKEEN. Give me the theater impact. What is the——

General O'NEILL. Brilliant Eyes promises to have a significant impact in the theater, especially in the area Mr. Livingston was talking about, the Naval Upper Tier. The Brilliant Eyes can provide a cue to a naval combatant well over the horizon. So with a LEAP-type system, the ship could actually engage the target outside of its radar range, and increase tremendously the footprint that that ship could have for missile defense.

Now, there are other sensors that we could use. One could use the E–2 aircraft that is part of the fleet; one could use AWACS or one could use a——

Mr. SKEEN. That is the usual battle plan that they are using now?

General O'NEILL. Yes, sir. The Brilliant Eyes just makes it much more robust, and the same thing applies for THAAD. THAAD could be supplemented significantly with Brilliant Eyes.

One of the things that people very often don't think about is electronic countermeasures, wizard wars, where the enemy jams your radar. If the enemy jams your radar, the question is what else do you have to see him coming? If you have this Brilliant Eyes satellite, you can see him coming if he has every jammer in the world turned to your radar, and that is the exciting thing that Brilliant Eyes provides for the TMD.

BRILLIANT EYES MILESTONES

Mr. SKEEN. What are the accomplished milestones in the program? Where are we in that?

General O'NEILL. Well, the program was in demonstration/validation. We were actually in acquisition, as we are with THAAD. But because of the funding scenario and the philosophy of national missile defense, which is technology readiness, I am taking Brilliant Eyes out of the acquisition program and making it a technology readiness program. And that justifies the reduced funding.

But notwithstanding that, my direction is to stay on the same schedule in terms of providing an orbital demonstration of capability.

Now, that demonstration could constitute Mr. Livingston's Milestone Two that he was talking about for LEAP very credibly, and that would be in a time frame like 1998. So it would be very convenient when we have this flight demo to be able to say, okay, if we have a need it is now a system, and we are just going to buy several more of them. And then we could have a TMD capable sensor.

RISK ASSESSMENT

Mr. SKEEN. What kind of risk assessment are we in as far as what we have now, and how soon we can develop this system?

General O'NEILL. A risk assessment for Brilliant Eyes?

Mr. SKEEN. For Brilliant Eyes.

General O'NEILL. The risk I would call—the risk was low. I would call the risk still low for the theater missile defense version, which is a short-wave infrared, mid-wave infrared system.

I would call the risk moderate for the long-wave infrared system, which we didn't intend to test on-orbit, but we would test in the laboratory.

The problem with the long-wave infrared is that you need to have a cooler that will keep a focal plane cool for years in space. We haven't achieved that capability yet anywhere but on a lab bench. And what we need to do is continue our development plan to reduce the risk of the long-wave infrared sensor for Brilliant Eyes.

PATRIOT PROGRAM

Mr. SKEEN. I know you are doing upgrades on the Patriot II and III and so on. Where are we on that?

General O'NEILL. Sir, we are in the process of deploying the upgrades to the Patriot PAC II, which includes an enhancement to the processor in the radar, some improved software and an enhancement to the receiver that is in the missile that receives the reflected radiation from the target that will increase by a factor of about four the area of coverage of the Patriot.

As far as PAC III is concerned, we are in the process of making the selection of a munition to be used, either for ERINT or Raytheon multimode. That decision has not been made final yet.

We are also in the process of upgrading the radar for the Patriot to give it significantly greater reliability and range capability and better capability against reduced signature targets.

Mr. SKEEN. On this PAC III upgrade, you mentioned a core program that will include an improved fire control radar on this new interceptor missile. How much of the $600 million that you have requested for this year on the Patriot system goes into that?

General O'NEILL. Sir, none of the dollars that are being asked for go into the PAC II. The PAC II has been paid for in previous years. We haven't gotten it to the field yet because our procurement monies, for example, are three-year monies. But we are spending, I think, 1992, 1993 and 1994 dollars on the PAC II.

The monies that we are asking for this year, to my understanding, are all for PAC III. Is that true? Yes, that is true.

Mr. SKEEN. You have other monies in the pipeline?

General O'NEILL. Yes, sir.

Mr. SKEEN. So the PAC III is taking all of the advantage of the $600 million?

General O'NEILL. Yes, sir.

Mr. SKEEN. What is the difference in radar systems?

General O'NEILL. One of the key differences in the radar systems between PAC II and PAC III is the power supply that generates the signal for the PAC II radar which for PAC II is a cross-field amplifier. We have now added a dual traveling wave tube (TWT).

Mr. SKEEN. Do you want to interpret that for me?

General O'NEILL. Well, it is a very large amplifier. It is used to generate the power. We are now using—we are going to employ two traveling wave tubes which are a generation of capability beyond the cross-field amplifier. We are talking about 1980s technology. I mean, this is nothing—this is no breakthrough. This is off-the-shelf kind of technology.

But you have to understand, the Patriot was designed and defined in the 1960s.

Mr. SKEEN. That is correct.

General O'NEILL. I mean, I was a Captain—I was involved in the Source Selection as a Captain in the Army in 1966. So it is old technology.

And what we are doing is we are putting new technology into it. But it will give us better range capability and a better capability to exploit either the ERINT or the multimode missile.

Mr. SKEEN. When you were a Captain, was that at White Sands?

General O'NEILL. Sir, it was at Redstone, Alabama. We went to White Sands to see some test sites.

Mr. DICKS. Mr. Visclosky.

Mr. VISCLOSKY. Mr. Chairman, I will defer.

Mr. DICKS. Mr. Darden.

Mr. DARDEN. No questions, Mr. Chairman.

PATRIOT DEPLOYMENT TO KOREA

Mr. DICKS. General, Mr. Skeen had mentioned Korea. Are you involved in this decision about deploying Patriot to Korea?

General O'NEILL. Sir, I was called by Mr. Deutch, and I provided to Mr. Deutch all of the technical details, and my staff provided technical details of capabilities against various targets and things like that.

Mr. DICKS. Which Patriot would we send over there if we were going to send it? PAC II?

General O'NEILL. Yes, sir. that is the one we have right now.

Mr. DICKS. And could you describe just briefly what kind of capability it has?

General O'NEILL. Well, the Patriot PAC II has a capability to defend against a SCUD-class target, ———

One would require some high ground to get better sensing that could allow that footprint to go out further. One of the things—the advantage that Patriot PAC II has over the old Patriot is that you can put the launchers in remote locations.

In the old days you had to have your launcher within one kilometer of the computer and radar. What we can do now is we can go out beyond 10 kilometers in any direction and put launcher sites. And this gives an enhanced capability to the Patriot, gives it better survivability.

There isn't just one big target for the enemy to go after.

Mr. DICKS. In the situation in Korea where—much of this is forward deployed. Are their SCUDs forward deployed as well?

General O'NEILL. Yes, sir.

Mr. DICKS. Now, what is the time between there and, say, Seoul? I mean, it is not very long.

General O'NEILL. It is very difficult to defend Seoul because of its proximity to the DMZ. It is about 40 kilometers from the DMZ.

Mr. DICKS. Are you defending military bases?

General O'NEILL. Yes, sir.

Mr. DICKS. Which are further south?

General O'NEILL. Yes, sir.

Mr. DICKS. Can you be very effective against——

General O'NEILL. Yes, sir. You can defend the military bases.

Mr. DICKS. It is a point defense system?

General O'NEILL. It is what we called limited area defense.

Mr. DICKS. Limited area defense?

General O'NEILL. Limited area defense.

Mr. DICKS. In your judgment, from a military perspective should we have a Patriot in Korea?

General O'NEILL. Sir, I cannot make that judgment. I am not a warrior; I am an acquisition professional. So I would—you know, if you asked me when I was a First Lieutenant in the infantry, you know what I would say?

Mr. DICKS. Would you say yes?

General O'NEILL. Yes.

Mr. DICKS. All right. Thank you, General. It was a very good hearing, and we will stay in touch. There will be additional questions for the record.

The Committee is adjourned until 2:25 p.m.

[CLERK'S NOTE.—Questions submitted by Mr. Dicks and the answers thereto follow:]

REGIONS THREATENED BY BALLISTIC MISSILES

Question. The development and deployment of Theater Missile Defense must remain a very high priority. What regions of the world are most threatened by Ballistic Missiles—where is it needed the most?

Answer. Three regions of the world where theater ballistic missiles are most menacing are the Middle East, South Asia, and Northeast Asia. Countries having significant theater ballistic missiles in these regions include Iran, Iraq, Syria, India, Pakistan, China, and North Korea.

Question. Can you assess the threats to the U.S. interests from countries developing Theater Ballistic Missiles? What countries should be our biggest concerns?

Answer. Yes. We have good information on the countries developing Theater Ballistic Missiles (TBMs) including the country's: TBM capabilities and force levels; programs to obtain longer range TBMs; programs to produce weapons of mass destruction; and policies which are hostile to U.S. interests. The countries which should be our biggest concerns are: Iran, Iraq, and North Korea.

ALLIES COMMITMENT TO BMD

Question. As Third World Nations continue to acquire Ballistic Missile capabilities, the U.S. should expand cooperation on missile defense systems with our allies. What is the extent of our allies commitment to Ballistic Missile Defense programs?

Answer. As a result of the use of ballistic missiles in the Gulf War and their continued proliferation to hostile Third World nations and unstable regions, many of our allies are making serious commitments to ballistic missile defense. These commitments are evidenced both in unilateral actions by individual nations and multilaterally through the NATO alliance. Facing the most imminent threat, Israel has long pursued a ballistic missile defense program centered around the ARROW missile. In Asia, the threat of North Korean ballistic missiles have contributed to the Japanese government's decision to enter into bilateral discussions with the U.S. on missile defense. In addition to long-term support of U.S. BMD activities, the United Kingdom has recently initiated a pre-feasibility study to examine their specific requirements for national and forward deployed missile defenses. Similarly, the French, in their 1994 White Paper (this is the first defense white paper in 22 years), have called for a redirection of research resources to ballistic missile defense activities. In Germany, a decision is imminent regarding the course of action to develop and deploy the ballistic missile defense capable, TLVS or Corps SAM missile. Other nations are also demonstrating their emerging interest in missile defense through activities within the NATO Alliance. In addition to several NATO studies on ballistic missile defense, a NATO working group of seven nations (U.S., U.K., Germany, France, Canada, Netherlands, and Italy) has been established under the Conference of National Armaments Directors. This ad hoc working group has been chartered to deal exclusively with finding ways to cooperate in theater missile defense programs.

Question. Can you cite some examples of areas where the U.S. has benefitted in terms of technology and experience from the allies TMD program?

Answer. With the exception of Israel, allied TMD programs per se, are in their beginning stages of definition and execution. Therefore, with the exception of Israel, benefits to U.S. BMD programs were derived from the larger technical community of our allies and not specifically from a TMD effort. The following list shows examples of key allied contributions to U.S. BMD programs:

Israel—Aimable focused warhead concept, seeker/window performance.

U.K.—Insight into countermeasure technology, test bed design, NPB technology.

Germany—Background signature data, architecture studies.

Japan—WESTPAC architecture study.

France—Plume phenomenology, architecture study.

ISRAELI BMD EFFORT

Question. Israel is one of our most active allies/partners in BMD technologies. How do the Israelis BMD effort compare with those of our other allies? How committed are the Israelis to Ballistic Missile Defense in general and the joint U.S. Israel Arrow program?

Answer. While Israel's interest in ballistic missile defenses predate Desert Storm, its first hand experience as a vulnerable target of Iraq's SCUD missile attacks, coupled with its being surrounded by adversaries that possess ballistic missiles, reinforces its determination and national priority to develop a tactical ballistic missile defense system. Because of its immediate threat, Israel's tactical ballistic missile research, development, and deployment activities are more focussed towards immediate needs than activities of our other allies, several of which are just recently taking steps toward TMD system development. Israel has developed a tactical ballistic missile defense architecture that is continually updated to respond to its evolving threat. Israeli seriousness is also seen in their technology experiments, boost phase intercept concepts development, and by developing a missile defense system with the Arrow interceptor as the centerpiece. As reflected above, Israel is fully committed to the successful conclusion of the ongoing Arrow Continuation Experiments for the development of a tactical ballistic missile defense effort for the near term.

ARROW PROGRAM

Question. With regards to the Arrow program, has the U.S. benefitted in terms of technology from participating in the Arrow program?

Answer. Yes, the U.S. has benefitted from Arrow technology achievements. Arrow uses the identical focal plane array materials, manufactured by the same U.S. vendors as those of THAAD. Arrow has obtained the only flight data currently available from those focal plane array materials. All that data has been provided to THAAD. Other benefits for the U.S. TMD development programs include data on hypersonic missile flight; lethality and kill assessment; target signatures for infrared and radio-frequency seekers; infrared signature prediction codes; booster stage separation at high velocities and dynamic pressure; and hypersonic flight performance of radomes in the endo-atmosphere.

Question. There have been a number of problems during testing of this program, have these problems been resolved?

Answer. Israel is making good progress on the problems that have occurred with test of the Arrow I missile. They are using those lessons learned to make adjustments and improvements as required. The first Arrow I interceptor launched in 1990 was intentionally destroyed soon after launch because of a range radar problem calculating the safety to major population centers located in close proximity to the test range. That resulted in the current sea launch test arrangements. The Arrow is a new missile and each flight test has offered lessons learned to benefit the succeeding tests. In February and October 1993 the Arrow I missile demonstrated its ability to guide within lethal range of the target. In those tests the Arrow I radar fuze did not generate the required warhead detonation, so an actual intercept did not occur. The fuzing device in the tactical Arrow II configuration will be of a different design. The most recent Arrow I attempted flight did not result in a completed test because a ground support computer failure prevented launch of the interceptor. Israel is now reassessing their test procedures before their next test attempt.

ASCENT/BOOST PHASE INTERCEPT

Question. A concept that I have supported, and which was explored for some time was the use of SRAM Missiles on F–15s with a LEAP vehicle for an Ascent/Boost Phase Intercept capability. Can you tell me whether BMDO is still pursuing the use of these missiles for this capability? What other missiles are being considered for this program, and why?

Answer. The specific concept you are referring to, SRAM/LEAP, was primarily an Ascent Phase Intercept (API) capability. It would intercept TBMs in space, and therefore, the majority of TBMs would be intercepted after boost phase. The proponents suggested that after SRAM/LEAP we would 'grow down' to a true boost phase capability. We are no longer pursuing SRAM/LEAP per se. Instead, based on the recommendations of the Joint OSD/BMDO/USAF/USN API/BPI Study Panel, we are proceeding directly with a BPI technology demonstration which will also provide some API capability. The Panel recognized the significant payoff potential of intercepting during boost phase to ensure negation of TBM-deployed countermeasures and deter use of weapons of mass destruction (WMD) by causing shortfall of debris on, or close to, enemy territory. They concluded that BMDO should invest in a joint BPI technology program.

I anticipate numerous missile concepts and kill vehicle technologies will be evaluated for, and may contribute to, the BPI demonstration. SRAM missiles will be evaluated as a core booster, along with other air-to-air and air-to-ground missiles (HARMs, AMRAAM, Phoenix, etc.). Key criteria will likely include joint aircraft compatibility, availability, thrust-to-weight ratio, and growth to the objective BPI missile capability. LEAP technologies will likely play a role, although we are primarily interested in an endo/exoatmospheric interceptor (capable of engagements at higher speeds in the atmosphere).

DIRECTED ENERGY TECHNOLOGY

Question. For a number of years, the Army looked at the possibility of implementing directed energy technology for destroying missiles in their terminal phase. What value might a laser based terminal point defense system [such as the TRW (–IAI) guardian concept] have for protecting U.S. troops and allied forces from short range missile, rocket or artillery threats?

Answer. The Army is examining the use of directed energy systems of the GARDIAN (General ARea Defense Integrated ANtimissile system) type for point defense of U.S. and allied high value assets against ground to ground and air to ground missile and rocket type weapons. Such short-range laser defenses offer limited promise against the precision weapon delivery systems that are playing a major role in today's battlefield. They are especially effective against weapons which use optical homing sensors. Their utility is smaller, however, against radar guidance systems since it is intrinsically harder to laser radiation than optical guidance systems. Such missiles are often in their final terminal trajectory before the laser can irradiate them with high power, destroy the radar sensor and cause the missile to miss its target. As a terminal defense against ballistic missiles of the SCUD type or larger, GARDIAN-type systems have no significant capability and are therefore of little value to BMDO's mission.

HYPER-VELOCITY GUN

Question. In May, 1989, the U.S. and Israel initiated a jointly funded project to develop, integrate and demonstrate a low cost, hyper-velocity gun weapon system technology for ground based missile defense to complement systems such as CORPS SAM. What is the status of this program? What applications might this program have for U.S. TMD efforts?

Answer. The U.S./Israeli Hyper-velocity Launcher Program (HVL) is in the process of being terminated. Funding for the program in FY94 was issued to the field with instructions that it be used for any final contractual obligations under the present contracts. The U.S. has no direct requirement for a HVL weapon for missile defense and insufficient funds and priority preclude continued funding as a technology program. Technologies developed in this program will be provided to the Army (and possibly the Navy) which is developing concepts for tactical battlefield application of HVL.

The technologies developed under the HVL program could be spun off to meet future TMD requirements; for example, the gun technology could be used in future Short Range Air Defense Systems and the projectile guidance could be well suited for hypervelocity missile applications such as boost phase intercept.

MISSILE WARNING CAPABILITIES

Question. I remain very concerned about our missile warning capabilities. Do you feel that Theater Missile Defense would be best served by placing the space-based early warning capabilities under BMDO as opposed to leaving them under Air Force control?

Answer. TMD is best served by continuing the current arrangement with the Air Force. The space-based early warning capabilities support a large list of operational missions, only one of which is TMD. For example, other missions include strategic warning, warning to theater forces for passive defense, targeting, and support for attack operations against missile launchers, detecting space launches, and several other classified missions.

Furthermore, the Air Force Space Command Technical Exploitation of National Capabilities Office has been extremely successful in leading the development of TALON SHIELD. In October 1994 the TALON SHIELD system will become the first operational system whose R&D was funded by BMDO. TMD has benefitted (at no cost) from Air Force efforts to merge other intelligence sources with the system, yielding better bounding of capabilities and understanding of the overall theater air defense picture. The Air Force lead has also facilitated an awareness and incorporation of TMD capability within the Air Force. The Air Force is staffed to execute their current role; they have been very successful, and we see no reason to change the existing relationship.

BRILLIANT EYES PROGRAM

Question. With the recent decision by now Deputy Secretary of Defense John Duetch to cancel DSP 24 and 25, and start an interim advanced technology demonstration and then the ALARM program, where does the Brilliant Eyes program fit into this architecture?

Answer. The decisions on the space-based early warning system (i.e., DSP, FEWS, and now ALARM) are independent of the Brilliant Eyes (BE) program. Space-based early warning systems have the primary responsibility to detect ballistic missile launches anywhere in the world with very high reliability and very low false alarms. On the other hand, Brilliant Eyes provides precise tracking of ballistic warheads to support interceptors for NMD and TMD. While it is possible, but not cost effective, to perform the TW/AA missions from a low altitude satellite platform, it is impossible to perform the midcourse tracking missions from high altitude satellites. Studies have been performed to examine the potential of combining the two missions in a single satellite system. The answers from several different, independent sources show it is more expensive and risky to combine the two missions on the same satellite. It is more cost-effective to acquire a moderate number of low altitude BE satellites and a few geosynchronous ALARM satellites.

Question. It's my understanding that Brilliant Eyes does in fact have theater capabilities, are you taking full advantage of these capabilities in the Theater Missile Defense architecture?

Answer. The objective Brilliant Eyes system, as currently envisioned, will have significant Theater Missile Defense capability. The early warning architecture, known as the Theater Event System (TES), will integrate Brilliant Eyes with other existing and planned assets such as Talon Shield, JTAGS, and the AWACS EAGLE airborne sensor.

The Brilliant Eyes flight demonstration satellites do not perform the real-time processing needed in the TMD environment. They will demonstrate sensor performance and the Brilliant Eyes concept of operations and provide phenomenology data for use on future TMD development efforts.

PATRIOT DEPLOYMENTS TO KOREA

Question. What is the current status of Patriot deployments for U.S. forces deployed in Korea?

Answer. Six Patriot batteries (48 launchers) arrived in Pusan, South Korea on April 17 and 18, 1994. These batteries will be deployed at major ports and air fields vulnerable to possible North Korean missile attacks.

Question. What, in your professional opinion, should we be doing about these new developments? Do we have adequate missile warning and tracking capabilities?

Answer. We are keenly aware of the increasing threat posed by short- and medium-range ballistic missiles armed with nuclear, biological, or chemical warheads. In response, we have undertaken a variety of programs to improve our capabilities to actively defend against theater ballistic missile attacks, to develop more advanced "passive" defensive measures to protect our forces, and to improve our intelligence and early warning capabilities.

In the case of Korea, six Patriot batteries arrived in South Korea on April 17 and 18, 1994 to deter and if necessary defend against possible North Korean missile attacks. In addition, available missile warning capabilities have been deployed to the Korean theater.

Sending the Patriot batteries to South Korea is only an interim step; in the long term an advanced theater missile defense (TMD) capability will be increasingly important as potential adversaries acquire more advanced ballistic missiles and seek to develop warheads to deliver weapons of mass destruction. In response to this threat, DoD has reoriented our missile defense effort toward theater defenses. Our overall ballistic missile defense program calls for $12 billion to be spent on theater ballistic missile defenses during FY 1995–99.

The Ballistic Missile Defense Office is working to develop and field an effective point defense theater ballistic missile defense capability as quickly as possible. For addressing the point defense needs of our military forces, we intend to rapidly field the Patriot Advanced Capability–3 (PAC–3) along with upgrades to the Aegis/Standard Missile Block IVA on board ships to provide greater lethality, range and accuracy for our theater ballistic missile defense.

The Theater High Altitude Area Defense (THAAD) system will improve our ability to defend broad areas in a theater of conflict. THAAD is designed to defeat longer-range theater missiles by intercepting them earlier in their trajectory at greater distances from the defended area, thereby protecting a much larger area and reducing the possible effects if the missiles are carrying nuclear, biological or chemical warheads. When operated together, these TMD capabilities will provide a layered defense with a high probability of defeating attacks by enemy ballistic missiles on our forward-deployed forces.

Other, more advanced, long-term TMD capabilities are currently being evaluated. These include sea-based upper tier TBM defenses, the Corps SAM program, and concepts that use combat aircraft or unmanned air vehicles to intercept TBMs over enemy territory during their boost or ascent phase. Finally, we are exploring promising concepts for improving our capability to locate, identify and destroy mobile launchers of theater ballistic missiles prior to or immediately after missile launch.

We are also looking at improvements to our missile warning capabilities. In the near term, we developed a program called TALON SHIELD which exploits the missile warning capabilities provided from the Defense Support Program (DSP) satellite system. During the Gulf War, DSP performed well in detecting SCUD missiles and providing warning to coalition forces because conditions were optimum. Nevertheless, one of our lessons learned from the War was that we needed to improve that capability. Consequently, the Air Force has been looking at ways to obtain every bit of capability inherent in the DSP sensor.

With the TALON SHIELD program, which will become operational as ALERT (Attack and Launch, Early Reporting to Theater) in late 1994, the Air Force has developed a highly capable processing and dissemination system to deal more effectively with theater ballistic missile threats. By using commercial hardware and software and rapid prototyping procedures, and combining data from multiple DSP satellites together with all-source information, TALON SHIELD has demonstrated major improvements in the detection and tracking of these missiles.

This improved capability will help bridge the gap until we can field a more capable satellite missile warning system—called ALARM (Alert, Locate, and Report Missiles), which is planned for first delivery in 2004.

[CLERK'S NOTE.—End of questions submitted by Mr. Dicks. Questions submitted by Mr. Hefner and the answers thereto follow:]

CRUISE MISSILE THREAT

Question. Gen. O'Neill, you mention in your statement the need for defense against advanced cruise missiles. Your staff has briefed my staff that you are not concerned about a cruise missile threat that involves a low radar cross section. There seems to be an inconsistency here, could you clarify your position?

Answer. Although defense against cruise missiles is not within the strictest sense of the BMDO charter, this threat to our forces is of great concern. In fact, BMDO is funding PAC-3, Navy lower tier and Corps SAM, all of which must be capable against low cross section cruise missiles. Most of BMDO's sensor development efforts have been oriented toward the reduced signatures of TBMs (relative to those aircraft). Increased detection capabilities against reduced signature TBMs have obvious application to the potential low radar cross section of cruise missiles as well. Note, however, that this is a collateral capability brought about by advances in ballistic missile defense sensor technology.

There exists a postulated very low signature cruise missile threat against which conventional surveillance sensors have limited effectiveness. While BMDO's focus has been on ballistic missile defense, the services have generated requirements that also address the potential cruise missile threat as part of their overall air and missile defense mission. The requirement to simultaneously search for both TBM and cruise missile threats, in addition to aircraft, is an extremely stressing one in terms of radar energy management. Corps SAM, for example, has requirements that reflect the broad range of threats from cruise missiles to ballistic missiles—a very challenging problem.

My staff has been briefed on a specific program, HAVE YAK, which does address detection of a very low signature target. This program originally conceived and funded by the Air Force, is limited to the air breathing threat, and has no collateral capability to detect ballistic missiles which are the procipal focus of BMDO. Consequently, BMDO has not participated in funding this program.

HAVE YAK PROGRAM

Question. The Air Force has been developing a program to locate cruise missiles that have a low cross section. This program called HAVE YAK, was identified for funding in the BMD budget last year by this committee at a level of $6.5M. Since then General Horner of the CINC for Space Command has expressed strong support for this program. Despite this, I understand you do not intend to fund this program. Is that correct? If so, what other programs do you have to satisfy this requirement?

Answer. At this time, we have not allocated BMDO funds for the HAVE YAK program. All of the BMDO interceptor programs have collateral requirements for active defense against ballistic missiles. BMDO programs do not currently have a validated requirement to detect or destroy cruise missiles with the signatures addressed by the HAVE YAK capability. As you know, the strategic cruise missile active defense technologies have been largely developed under the Air Defense Initiative (ADI) effort which was funded separately for BMDO. It is our understanding that the Services have other classified programs that address the threat that HAVE YAK has also been designed to counter.

[CLERK'S NOTE.—End of questions submitted by Mr. Hefner. Questions submitted by Mr. Young and the answers thereto follow:]

CRUISE MISSILE/GROUND HUGGER/SEA SKIMMER THREAT

Question. General, I've looked over your prepared statement and would commend you for your efforts in attacking a big problem with ever decreasing funds. It looks like systems such as patriot and its associated improvements are coming along very well. There is one threat, however, that I'm concerned about whether we are doing enough to counter it and that's the cruise missile or the ground hugger/sea skimmer threat. I know that it's not formally a part of your charter, but could you give us your opinion as to how we are doing in this area?

Answer. Sensor development efforts within BMDO have been oriented toward the low radar cross section (RCS) signatures of the TBM threat set. Such increased detection capabilities have obvious application to cruise missiles (CM) as well. We must acknowledge that the requirement to search simultaneously for TBM's aircraft, and CM's is extremely stressing in terms of radar energy management. This can be alleviated somewhat by emplacing additional sensors and focusing on one mission or the other. At sea, netting the radars for a common picture would allow a similar division of labor. Work is on-going to address this three-dimensional, very complex problem, but much remains to be resolved. One BMDO program that has not yet become an acquisition program but may become one in the future is Corps Sam, which has requirements that reflect the broad range of threats from cruise missiles to ballistic missiles.

My staff is aware of the specific program, HAVE YAK, which does address detection of a very low signature target. This program, originally conceived and funded by the Air Force, is limited to the air breathing threat, rather than ballistic missiles for which BMDO has primary responsibility. Consequently, at this time BMDO has not allocated funding for this program. Considering the importance of the cruise missile threat to the Services' overall air and missile defense mission, I am confident that they will continue to pursue the appropriate programs to address this threat.

HAVE YAK

Question. I understand we put some funds in your R&D Budget last year to look at a program called HAVE YAK which appeared to show a lot of promise in countering this threat. Could you tell us how you plan to use these funds?

Answer. BMDO allocated the funds that would have been spent on HAVE YAK to the Ground Based Radar (GBR) and systems engineering programs.

Question. I'm told that a recent Army Air Defense Study recommended elevating cruise missile defense on the priority list. I'm also told that last year's funds have not yet been released and that if they are not released soon, this effort may be shut down and our investment in HAVE YAK would be lost. Are you aware lf this?

Answer. HAVE YAK was originally conceived and funded by the Air Force and is limited to the air breathing threat rather than the ballistic missiles for which BMDO has primary responsibility. It is our understanding that the Air Force has stated that they do not plan to budget O&M dollars for this program or use it in the future, even if it is successfully developed. Without a user "pull" from the Services, it is difficult to justify the expenditure of funds to develop HAVE YAK. We have not, at this time, allocated funds for this program. Since the mission of HAVE YAK would likely be accomplished from a fixed wing aircraft against a low radar cross section air breathing target, it falls outside of BMDO's traditional acquisition responsibilities. Termination of HAVE YAK at this time will result in transfer of useable technology into the Air Force for future application as required.

[CLERK'S NOTE.—End of questions submitted by Mr. Young. Questions submitted by Mr. Lewis and the answers thereto follow:]

THAAD COSTS

Question. Recently THAAD cost figures came out indicating that the total THAAD program would cost $17 billion, including approximately $2.7 billion over the next five years. How does this compare to developing a common ballistic missile kill vehicle under boost phase intercept for Navy Upper Tier, and a Patriot PAC–4 upgrade?

Answer. An updated acquisition cost estimate of $12 billion in then-year dollars was made during the development of the FY95 President's Budget, with $8.3 billion for THAAD and $3.7 billion for TMD–GBR. These estimates included higher revised inflation rate assumptions and included both RDT&E and Procurement costs but did not include estimates for Operation & Support (O&S) costs. At this point it is too early in the development stage to finalize O&S costs for these systems, as O&S cost estimates are still being developed.

The LEAP technology effort offers a high risk option to develop a common kill vehicle for boost phase intercept, exo/endo Navy upper Tier intercept and terminal phase advanced Patriot intercept. However, such an option can be envisioned to be more easily optimized for a single application and must be traded off with other ways to accommodate the same requirement. For example, there are currently no plans for developing a PATRIOT PAC–4 capability. BMDO, working closely with the Navy, continues to evaluate and study potential material alternatives for interceptors and kill vehicles for Navy Upper Tier, including LEAP, THAAD, and other options. Our anticipated funding of Sea Based Theater Wide (Upper Tier) specifically calls for continuation of THAAD–AEGIS compatibility studies (allowing continuing evaluation of the potential to add a THAAD to the Sea Based AEGIS system), evaluating the technical data collected completing the TERRIER–LEAP flight tests in FY 94, and doing trade studies and analyses to support decisionmaking.

Question. With the increasing pressures on the Ballistic Missile Defense budget, why not rebalance the core TMD program by developing THAAD on a moderate-low risk schedule and doing boost phase intercept and Navy Upper Tier in the near term?

Answer. The THAAD schedule was designed to give the nation capability in the 1996 time frame. This User Operational Evaluation System (UOES) would give our forces an Upper Tier system that could be deployed to a crisis well before the end of the decade. Recent events in North Korea clearly show that we are on the right track: developing a near term solution to the difficult problems of longer range TBMs with the potential of carrying Weapons of Mass Destruction including chemical, biological or nuclear pay-loads. The technology demonstration for Boost Phase Intercept (BPI) that BMDO has initiated will prove the concept of operations, develop the technology, and demonstrate feasibility of BPI. The near term results of these efforts—THAAD development including flight tests over the next two years coupled with the lessons we learn from our BPI—should give us answers we need that will help in the development of the most appropriate Navy Upper Tier interceptor.

Question. What is the cost-effectiveness and affordability tradeoffs between THAAD and Boost Phase Intercept/Navy Upper Tier development and deployment plus Corps SAM R&D?

Answer. These systems cannot be compared with a simple cost-effectiveness and affordability trade-off. Each system has a different mission and battle space. They have differing capabilities and limitations that provide the best missile defense protection when they operate in a combined environment where the synergism between their individual capabilities provides a solid defense against a wide range of threats. THAAD is the most critical element in the core program, designed to fully match the existing threat. The advanced capability systems each add capabilities to the core program. The Sea-based Wide Area concepts provide long range protection from a non intrusive, easily deployable platform. Corps SAM provides 360 degree protection for maneuvering forces, rapid deployment, and protection from cruise missile threats. The Boost Phase Intercept program destroys missiles over enemy territory and is particularly effective at defeating TBM deployed countermeasures and reducing friendly collateral damage from chemical, biological, or nuclear warheads. Since the principle of boost phase engagement has yet to be proven, it would be unwise to suggest at this time that THAAD and Boost Phase Intercept can be accurately contrasted on a cost/schedule basis; for example, it may be necessary to deploy an advanced sensor for Boost Phase which could be much more expensive than THAAD or Navy Upper Tier sensors. These advanced concepts will be considered for a new acquisition start based on national priorities, threat, operational need, and affordability.

Question. There are growing indications that THAAD, and especially the THAAD missile, is experiencing major development problems and cost overruns. What is the status of the THAAD program, and is any consideration being given to bringing on a second source for the missile development to hedge against uncertainty?

Answer. The THAAD program including the THAAD missile is experiencing normal Demonstration/Validation technical problems. The prime contractor and the Government are aggressively resolving these problems. I would be very happy to direct an evaluation/investigation of any "problem or cost overrun" which has come to your attention. From the outset of the program the Government estimate of completion costs did exceed the contractor estimate. All we've observed thus far is the cost trend we expected to see. The program is on schedule for a final Design Review Update in May 1994. The prime contact has incurred unfavorable cost and schedule variances and has forecasted a cost overrun. Overhead rate increases have contributed significantly to the cost variance. However, the THAAD Program can be executed within funding available in FY94 and planned for FY 95–96. The Government is aggressively taking action to manage cost growth of the program. Bringing on a second source for missile development would cost $300–$400M and delay the THAAD program by 2–3 years and is not being considered at this time.

Question. Given the importance of THAAD to the core TMD program, why is THAAD being rushed along with a high degree of concurrency and risk?

Answer. THAAD is a high priority within the TMD program, that will provide a robust defense against the escalating threat of tactical ballistic missiles, some of which cannot be effectively countered by any existing U.S. weapon system. The approved THAAD development schedule is a result of the seriousness of the TBM threat, as noted in the Missile Defense Act of 1991 and numerous DoD reviews of defense priorities. The need for effective defenses against TBMs is underscored by the wide proliferation of ballistic missile technology and chemical, biological, and nuclear weapons technology among nations hostile to U.S. interests. The objective THAAD program matures on about the notional 10-year (FY93–FY02) schedule which is customary for major defense programs. The only difference between this and other programs is the initiative, approved by Congress, to provide at the conclusion of dem/val a quantity of prototypical hardware for operational user evaluation, which could be deployed in a contingency. The approved development schedule will facilitate the delivery of a User Operational Evaluation System (UOES) in 1Q FY97. The UOES will not have the full functionality to be developed with the objective system, but will provide significant new capabilities which could be used in the event of a national emergency. In addition, the accelerated Demonstration/Validation (Dem/Val) phase of the program will allow for early entry into the Engineering and Manufacturing Development (EMD) phase which will lead to earlier fielding of the THAAD system than would otherwise be possible. Although the accelerated development strategy does contribute to the risk and concurrence of the Dem/Val phase, the development strategy includes provisions to maintain risk at acceptable levels. The program cost estimates approved at Milestone I include significant risk reduction funding which is applied by the Project Manager to address areas where significant schedule or technical risk is incurred. Any risk resulting from the accelerated development is felt to be justified by the urgency of the need and seriousness of the threat.

BOOST PHASE INTERCEPT

Question. What is the Navy's role in Boost Phase Intercept? Are they interested in common kinetic kill vehicle development for both the Boost Phase Intercept mission and Navy Upper Tier?

Answer. Navy is a full participant in the Boost Phase Intercept effort. The Department of Defense intends that the BPI work involve and be compatible with both Navy and Air Force aircraft. The Navy is involved and will evaluate the various Kinetic Kill Vehicle (KKV) technologies and assist in determining the most operationally and cost effective KKV for both the aircraft and ship application. The Navy's also interested in being involved indirectly in the BPI demonstration including test range and test asset coordination, weapon integration onto the aircraft, sensor-interceptor processing, and modeling and simulation.

THEATER MISSILE DEFENSE CORE PROGRAM

Question. What is the cost-effectiveness and affordability of a Boost Phase Intercept/Navy Upper Tier/Corps SAM architecture, versus the core program? How would the schedules compare?

Answer. The BUR selected the core programs to meet the near term threat within the funding levels approved by Congress. Near term core programs and advanced concepts cannot be compared with a simple cost-effectiveness and affordability trade-off. They each fill a verified need and should be evaluated on their individual merits. Boost Phase Intercept, if operationally viable and technologically achievable, would be an enormous deterrent because conceptually, it would give us the capability to kill the weapons of mass destruction and drop debris back on the enemy. No other system alternative would offer us the opportunity to have this early in-flight catastrophic effect for the enemy. The cost of BPI would be primarily in interceptor and sensor development. The system will be integrated into existing aircraft. A Sea Based Upper Tier offers us the opportunity to leverage upon our existing infrastructure of AEGIS ships, their launchers and combat systems. Because the ships may be positioned closer to the launch site of the TBM than our terminal defense systems such as THAAD and PATRIOT, the Sea Based Upper Tier can provide dramatic overland defense. Corps SAM would be the first system capable of moving with the Army Corps and providing the 360 degree protection and cruise missile defense we believe is needed. All three systems, BPI, Navy Upper Tier, and Corps SAM are unique in their contribution to TBMD. Finally, the Mission Need Statement (MNS) provided by the JCS to the BMDO directs active defense effort in all phases of the TBM flight path: boost, post-boost and ascent, midcourse and terminal. Only a mixture of highly effective systems can satisfy the requirement. Fielding the PAC–3 in FY98, the Navy Lower Tier in FY99, and the THAAD in FY02, will provide early protection for our forward deployed forces and our allies. We project that the BMDO budget will allow the initiation of the acquisition program for one of these advanced capabilities in 1998.

CORE TMD RESPONSIVENESS

Question. How responsive is the core TMD program to simple theater ballistic missile countermeasures like payload fragmentation, maneuvering and submunition?

Answer. The BMDO "core" programs all have a requirement to provide effective defense across a broad spectrum of situations which includes the aggressor's use of penetration aids, decoys, false targets and other techniques. We develop the resistance to countermeasures by evaluating what we can reasonably anticipate to encounter. Additionally, we have flight test programs specifically designed to evaluate the difficulty our systems would encounter due to countermeasures or dynamic events of the target. The BMDO Threat Countermeasures Mitigation Program (TCMP) conducted flight tests in FY93 in order to gather information and evaluate techniques we might add to improve our defensive systems. A classified briefing can be made available upon request.

Question. What program does BMDO have within its acquisition stream to keep the core TMD program responsive to simple TBM countermeasures?

Answer. We develop the resistance to countermeasures by evaluating what we can reasonably anticipate to encounter. Additionally, we have flight test programs specifically designed to evaluate the difficulty our systems would encounter due to countermeasures or dynamic events of the target. The BMDO Threat Countermeasures Mitigation Program (TCMP) conducted flight tests in FY93 in order to gather information and evaluate techniques we might add to improve our defensive systems. The BMDO "core" programs all have a requirement to provide effective defense across a broad spectrum of situations which includes the aggressor's use of penetration aids, decoys, false targets and other techniques. A classified briefing can be made available upon request.

NATIONAL MISSILE DEFENSE TECHNOLOGY READINESS PROGRAM

Question. Is the NMD technology readiness program, if fully funded at $600 million per year, able to yield an ABM treaty-compliant deployment within three years of a deployment decision and an increase in funding? If not, should it be focused into a super GBI program (including GBR, Optical Adjunct, and BM/C3 elements) capable of yielding a near-term deployment?

Answer. If fully funded at $600M per year, the NMD technology readiness program is structured to meet the requirement to begin fielding an ABM treaty-compliant defense approximately three years after a deployment decision and funding increase. Its approach is to develop an objective NMD system by the end of a series of three epochs. This will be accomplished by concentrating on the technology long poles and exoatmospheric kill vehicle (EKV) in Epoch 1, an active cueing element—Ground Based Radar (GBR) in Epoch 2, and a passive cueing element—Space and Missile Tracking System (SMTS) in Epoch 3. BM/C3 capability would be integrated in an evolutionary manner as requirements are refined.

This provides a low risk, methodical approach to address the technical issues within the $600M/year funding limitation. It allows periodic demonstration of increased defense capability as both technology and supporting systems become available. It will gradually reduce deployment time lines and risk for NMD contingency opportunities as the technology matures over successive epochs.

It is unnecessary to pursue a "super GBI program," as the present program meets all NMD goals. NMD system capability will depend on when the deployment decision and funding increase occur. If the decision was made near the end of Epoch 1 to quickly deploy a limited capability, a post-Epoch 1 deployment in three years would consist of an interceptor with upgraded Early Warning Sensors, a Ground Based Radar (developed during the deployment period from TMD–GBR technology), and an initial BM/C3 configuration (Build 1). Upgrades to this system would be required to amend limitations in sensor cueing and tracking (by accelerating development of a Space and Missile Tracking System, SMTS), interceptor reliability, supportability, and performance, and BM/C3 capability.

[CLERK'S NOTE.—End of questions submitted by Mr. Lewis. Questions submitted for the Record and the answers thereto follow:]

BOTTOM-UP REVIEW

Question. Is BMDO following the Bottom-Up Review (BUR) strategy regarding theater missile defense?

Answer. BMDO is following the BUR strategy regarding the TMD Core Programs. With respect to an Advanced Capability Acquisition Program, funding limitations preclude initiating a new program until sometime in 1998. Note that these funding limitations are a result of a $1 billion cut from the BMDO FYDP that was introduced following the BUR.

ABM TREATY COMPLIANCE

Question. To resolve the question of whether THAAD is treaty compliant or not, the U.S. has proposed clarifications to the treaty. What were our proposals and what was the Russian response? What is the status of the negotiations today?

Answer. ———.

Question. When will the remaining two planned studies on Navy Lower-Tier systems be complete?

Answer. The Navy Lower-Tier system treaty compliance report was delivered to Congress on March 30, 1994. The report stated that the system would be treaty compliant.

Question. Aren't we investing in programs (Navy Upper-Tier, Corps SAM or Boost Phase Intercept) that could be non-treaty compliant?

Answer. Missile defense concepts are developed in order to meet existing or imminent threats. Once the theoretical concept for countering these threats proceeds past the concept development and research stages, well before actual field testing of system prototypes, the proposed systems are reviewed for treaty compliance. Research is not constrained by the ABM treaty. The eventual deployment of some systems could be prohibited under current U.S. interpretation of the treaty. The administration has stated that it is confident that clarification between ABM and non-ABM systems can be reached with our treaty partners that would enable deployment of THAAD. Given the current and evolving theater threat, and the freedom to conduct research, it would be imprudent to prematurely permanently foreclose concepts even beyond THAAD which may provide significant theater defense potential, based on a presumption that those concepts may not be treaty compliant and would have to be abandoned at some point for that reason.

In the case of the three systems named in the question, it is premature to judge the treaty compliance status of these systems until their technical and operational concepts are more fully developed.

MANAGEMENT OF BALLISTIC MISSILE DEFENSE PROGRAMS BY THE SERVICES

Question. Which ballistic missile defense programs is BMDO currently responsible for and which has it delegated to the service?

Answer. The BMDO is responsible for all of the currently defined acquisition programs associated with Ballistic Missile Defenses to include Theater and National except for the fiscal year 1994 execution of the Brilliant Eyes Program. The funding and management of this program for FY94 was moved to the Air Force in conjunction with other Space-based Infrared Systems (DSP, FEWS). Brilliant Eyes is being returned to BMDO for FY95 and the outyears as part of the Technology Readiness Program for National Missile Defenses. BMDO delegates execution to the appropriate service retaining the responsibility as the BMD Acquisition Executive.

Question. Are the services initiating BMDO-type programs?

Answer. As BMDO advised Congress in FY93, it transferred the Airborne Laser (ABL) program to the Air Force on the basis of the far term follow-on nature of its development and Congressional direction to transfer such programs from BMDO to ARPA or the Services. The ABL effort is underway at this time for applications to boost phase TMD.

I am unaware of any other specific systems that are being developed by the Services at this time. There are various technologies that are potential candidates for systems that could be developed, however, I am not prepared to identify them at this time. Additionally, there are some joint efforts that we are working with the Services such as the Army Patriot, Navy Lower Tier and Air Force Boost/Ascent Phase programs.

Question. Do you believe these duplicate any BMDO programs?

Answer. No, we are working closely with the Services to insure that our efforts complement each other for the systems mentioned in the previous question.

Question. How much are the services requesting for BMDO-related programs? Provide a detailed breakout for the record by appropriation, fiscal year, and R–1 line item.

Answer. BMDO has returned to the services three major programs: Boost-Phase Surveillance and Tracking System (BSTS) and the AirBorne Laser (ABL) to the Air Force, and the Free Electron Laser (FEL) program to the Army. Due to budget constraints, the Army has terminated the FEL program. The Air Force has kept the BSTS Tactical Warning/Attack Assessment (TW/AA) requirements and is pursuing the ALARM program after FEWS was cancelled. Additionally, the Air Force is pursuing the ABL at a budget of $92 million across the FYDP.

There are several existing BMDO programs in which the services and BMDO are providing funding in support of overall requirements:

Patriot: Army funding for the Patriot program during FY 1994 and FY 1995 amounts to approximately $118 million and $76 million, respectively. These funds provide for RDT&E of the Patriot P3I test program and continued development of communications upgrades and generators, and Procurement funding for fielding, spares, and modifications for the weapon control computer (WCC) and classification, discrimination, and identification (CDI) systems.

Navy Lower Tier: Production missile costs for the Navy Lower Tier System will be shared between BMDO and the Navy on a 40% BMDO/60% Navy basis. Also, the Navy has already made and is continuing to make a substantial investment in the AEGIS ships, Vertical Launch System (VLS), the Standard Missile development program and BMC3 including JTIDS, Cooperative Engagement, and other systems.

Boost Phase Intercept: The jointly funded BDMO/Air Force Boost Phase Intercept (BPI) program will exploit interceptor and sensor technology in development under BMDO sponsorship as well as current service counter air assets to demonstrate this capability. We are currently working with the Air Force to identify Service and BMDO responsibilities for the BPI program. We intend to submit a plan to OSD this spring. In general, BMDO technology funding will support the development and flight funds will be used to perform necessary weapons integration/mods to existing aircraft and modify off board sensors as required.

Question. BMDO gave the Army the Free Electron Laser program, and the Army has terminated it. Do you agree that it should have been terminated?

Answer. That's an Army call, subject to Army priorities. Given BMDO's focus on TMD, and sharp cuts in resources, it is certain we would have had to cut it further back.

Question. Congress directed that no more than one public affairs office be funded with BMDO funds. Has this direction been implemented? How many staff did you move and how much money did you save?

Answer. The Department will comply with this direction. The DoD will fund only Ballistic Missile Defense Organization (BMDO) External Affairs office with the BMDO appropriation.

The U.S. Army Space and Strategic Defense Command's Public and Governmental Affairs office, which has the responsibility to support the command's non-BMDO missions, will not be supported by the BMDO appropriation. Funding for this office and its eight personnel will be by the Department of the Army appropriation beginning in the last quarter of this fiscal year.

STAFF INCREASE

Question. BMDO was authorized 100 more staff positions in fiscal year 1994. However, BMDO is the executing agent for only 16 percent of fiscal year 1994 and 1995 BMDO funds and provides the rest to the services to administer. How many staff did BMDO start off with in fiscal year 1994, how many does it have currently, and how many will it end the fiscal year with?

Answer. BMDO is authorized 243 civilians and 118 military personnel for FY 1994. Currently, there are 136 civilians and 112 military on board. We estimate 200 civilians and 112 military on board by the end of FY 1994.

Question. Why does BMDO need more staff, especially since the percent of BMDO funds that BMDO administers itself actually decreased from fiscal year 1993 to fiscal year 1994.

Answer. In the past, BMDO's government staffing has been held at a low level resulting in a high usage of contractor support to accomplish the mission. BMDO's increase in government personnel is in direct response to our decrease in support contractors. This action resulted from Congressional concerns about BMDO's over reliance on support contractors and BMDO's high contractor-to-government worker ratio which resulted in a Congressional cap on BMDO's support contractor funding. A draft DoD Inspector General audit report has found that BMDO could reduce costs by gradually reducing its contractor support and by hiring DoD civilian employees to accomplish the BMDO mission. Both the DoD Inspector General and the General Accounting Office have completed analyses which consistently support an upward adjustment of BMDO's government staffing levels.

Question. Does BMDO plan to increase its staff in fiscal year 1995?

Answer. BMDO plans to increase its staff in FY 1995 with comparable decreases in contractor support. No additional funds have been requested in the Future Year Defense Plan for these additional government personnel. Cost savings from reduced higher-priced contractor support will be used to pay for the increased government civilians.

NATIONAL MISSILE DEFENSE

Question. If it would take about three years to deploy after each phase, what does this program buy us?

Answer. The technology readiness program will establish the basis for deployment of the objective NMD architecture. Simultaneously, the program will protect early and mid-term options for deployment within approximately 3–5 years of single-sit, treaty compliant defensive architecture. Each of these options for deployment will be based upon careful maximization of technological maturity together with efficient consideration of deployment timelines. Of course, the early options will have less mature performance and will be capable of defense against a less mature ROW threat than later options. It buys limited protection for an early contingency and increased protection for a mid-term contingency against increasingly sophisticated re-entry vehicles (RVs). It would not provide capability against penetration aids and countermeasures. The differences between the two systems would be hardware/software maturity, performance confidence, and deployment time.

A significant improvement in protection (greater than 90% probability of zero leakages) would be achieved with the objective system which could address the existing threat capabilities, but would be slightly less effective against threats with multiple warheads, contact fuzing and penetration aids.

Question. At the end of each of the three main phases of the program, what is the improvement in terms of capability to protect the U.S.?

Answer. End of Early Phase: The contingency capability will provide moderate protection of the U.S. (CONUS only for treaty compliant single site deployment) against currently existing unsophisticated threats (large warm/cold RVs).

End of Mid-Term Phase: The contingency capability will provide moderate-to-good protection of the U.S. (CONUS only for treaty compliant single site deployment) against medium sophisticated threats (large warm/cold RVs, including salvage fuzing).

End of Objective System Phase: The objective system will provide excellent protection of the U.S. (CONUS only for treaty compliant single site deployment) against the current and projected (Year 2000) threat spectrum.

Question. If there is no real improvement in terms of capability to protect the U.S. between phases one and two, what does the program buy us?

Answer. A mid-term contingency does provide an increase in capability, and includes the incorporation of radiation hardened components into the early contingency interceptor kill vehicle, provides a passive over-the-horizon missile tracking capability and provides additional contingency capability in a nuclear environment. Additionally, development and testing for a mid-term contingency provides: Additional risk reduction for early contingency elements, increased confidence in contingency capabilities should a deployment decision be made, and decreased contingency deployment timelines.

Question. What parts of the country will receive no protection from a single ABM treaty compliant site?

Answer. This is threat/scenario dependent. A single site in an early contingency will not protect portions of Alaska or Hawaii for any of the threat/scenarios while portions of the U.S. (CONUS) will not receive protection against the more stressing small cold RVs, electronic countermeasures, and multiple warhead threats.

Hawaii would not be protected even by the objective system, if it were deployed at a single treaty compliant site.

Question. What is the development plan for the GBI?

Answer. The development plan for the Ground Based Interceptor (GBI), as set forth in the BMDO 18 FEB 94 letter to the four defense committees, calls for an Army-managed program with input from the other Services designed to provide an incremental increase in capability and confidence. The program will address GBI technology "long poles," i.e. critical issues associated with the exoatmospheric kill vehicle (EKV) first, deferring other issues until later. It will also leverage off of TMD interceptor process to the maximum extent practical. This will provide the flexibility to respond to potential contingency defense requirements should the need arise. The overall goal is to complete technology readiness for the objective National Missile Defense (NMD) architecture.

Early activities will center around development and testing of "long pole" brass board seekers and development and testing of the integrated brass board EKV. The mid-term activities will address infusion of technology advances and/or other mission requirements, as well as development and testing of advanced exo kill vehicles to increase confidence, reduce risk, and demonstrate integration with the Ground Base Radar (GBR). Finally, efforts will focus on development and testing of a dedicated booster, systemization of the advanced exo kill vehicle into a full up interceptor, and testing of the objective ground based interceptor element.

The evolutionary development of a Ground Based Interceptor for National Missile Defense (NMD) provides a low risk approach to address both the technical issues and funding limitations. It allows periodic demonstration of increased defense capability as both technology and supporting systems become available. Initially this approach works the technology "long poles" and will gradually reduce deployment timeless and risk for NMD contingency opportunities. Deployment timelines can be reduced more rapidly by increasing emphasis on deployment "long poles". This strategy continues to protect an evolving deployment option should fielding of NMD be required.

BRILLIANT EYES

Question. What are the key milestones for Brilliant Eyes?

Answer. The current contract milestone is to develop and fly two flight demonstration system (FDS) satellites. These satellites will be launched in FY1998 to demonstrate BRILLIANT EYES (BE) operations and performance. These satellites will have sensors for TMD mission support but not the long wave infrared (LWIR) sensor suite necessary for the NMD mission support. The development and ground testing of prototype, operational LWIR sensors will be done in FY1999 through FY2000.

The BE program supports a deployment decision for a TMD-only system in FY1998 following the initial FDS demonstration. The deployment of an NMD system (which also supports TMD) could occur in FY2001 following the ground testing of the prototype operational LWIR sensors.

Question. Since Brilliant Eyes is a national missile defense program, is it also only a technology-base program, or does BMDO plan to deploy a system?

Answer. The decision to redesignate BE from an acquisition program to a technology readiness program is currently under OSD review. The current program does not support deployment of BE.

Question. Your budget justification indicates that the reduction in the Brilliant Eyes budget forced an 18 month slip in the launch of demonstration satellites (until 1998) and an early downselect between two competing demonstration contractors.

Please describe the risks associated with these actions.

Answer. Relying on only one contractor to fly satellites before a deployment decision increases program risk and may result in possible program cost growth due to reduced competition. However, since the program has not been selected for acquisition, deployment risk will be a function of contingency requirements and cost/schedule allocation. Although not building and flying flight demonstration satellites, the second contractor is being retained to independently develop technology, develop end-to-end real-time simulations and fabricate prototype engineering model sensors. The retention of the second contractor partially mitigates the increased risk.

Question. What are the costs associated with terminating one of the demonstration contracts?

Answer. Termination costs are not expected to be large because little hardware has thus far been produced and the program restructuring is being handled through contract modifications. The contract option to fabricate the flight demonstration satellites has not been exercised, therefore, the expected impact is slight.

Question. The budget justification indicates that the risks associated with these changes is to be mitigated by the "midcourse space experiment". How will this experiment mitigate the risk?

Answer. The Midcourse Space Experiment (MSX) is critical for space-based sensors. MSX will collect infrared, visible and ultraviolet data on exoatmospheric targets and backgrounds to validate models and sensor designs. MSX will also demonstrate target acquisition and tracking, verify the sensor's ability to track targets against stressing backgrounds, and demonstrate state-of-the-art sensor and spacecraft technologies. MSX data will be used to determine how an infrared tracking sensor in space hands off state vectors to an exoatmospheric kill vehicles (EKV) so that the EKV can best guide itself to the target.

Question. In fiscal year 1994, Congress transferred Brilliant Eyes to the Air Force. Why is it now back in BMDO's budget?

Answer. Due to concerns of space-based infrared mission overlap among the DSP, FEWS and BE program, and funding shortfalls, Congress transferred BE to the Air Force in FY1994. OSD decided to terminate the FEWS contracts, cancel the procurement of two DSP satellites, and pursue the ALARM program. The decisions on DSP, FEWS and ALARM were independent of decisions on the BE program. BE is an essential element of Ballistic Missile Defense active defense systems. It does not perform the global tactical warning/attack assessment missions of DSP and ALARM. OSD transferred BE back to BMDO in FY1995 and the out years to maintain critical integration with other BMDO programs.

PATRIOT UPGRADE

Question. Your statement discusses near-term Patriot upgrades of the fire unit, launch detection, radar, and missile. Could you explain each of these components and their benefits?

Answer. Fire-unit: A fire unit is the smallest element of the Patriot system consisting of eight launchers, an engagement control station (ECS), power generators, and C3I equipment. The term fire unit is synonymous with battery. The planned improvements include an Expanded Weapons Control Computer (EWCC) in the ECS to provide greater processing speed and capacity to handle greater track loads and to provide room for future expansion. Data recording capability is being added to allow accurate reconstruction of target flights and intercepts. Improvements in the remote launch capability will greatly expand the defended footprint of the PAC-3 system. External communications will also be modernized at the fire unit and headquarters levels to provide increased interoperablity with external sensors and C3 nodes.

Launch Detection: Launch point determination is a software improvement to allow rapid and accurate counter-force targeting of the threat TBM launch point. This capability is key to rapidly locating and targeting threat TBM launchers by counterfire forces.

Radar: Upgrades to the radar include providing increased sensitivity of the receiver to allow detection of smaller targets in the presence of noise. Additionally, improved microwave devices (dual vice single travelling wave tube) will be integrated to allow control of multiple, simultaneous engagements against multiple TBM and low radar cross-section cruise missile threats. This allows for improved radar multifunction capability (surveillance, track, and inflight interceptor control simultaneously). Reduction of radar antenna sidelobes and other related software improvements will reduce the vulnerability of the PATRIOT system to anti-radiation missiles (ARM).

Missile: The Army considered two of its on-going programs as candidates for the PAC–3 missile—the multi-mode missile, a major improvement to the PAC–2, and the Extended Range Interceptor (ERINT), employing hit-to-kill technology. ERINT was chosen by the Army as the PAC–3 missile. This missile provides increased battle space and responsiveness to longer range threats (TBM, airbreathing, and cruise missile) over the PAC–2 missile. In addition, the ERINT missile was chosen for its increased lethality against TBM threats, particularly weapons of mass destruction such as chemical submunitions.

Question. What is the status of this near-term upgrade program?

Answer. The near-term improvements allow PATRIOT to be emplaced quickly, improve radar performance against low radar cross section targets, provide faster data processing capability, and increase the defended area by allowing a separation of 12-km between the radar and launchers. The Quick Response Missile (QRM), subsequently renamed the Guidance Enhancement Missile (GEM), is an enhanced PAC–2 missile. When fielded in limited quantities in 1996, GEM will improve system effectiveness and lethality against higher-speed TBMs. The combination of PAC–2, QRP, and GEM comprise the baseline capability of PATRIOT for the PAC–3 improvements.

Question. What percentage of the Patriot system will have near-term upgrades?

Answer. The current plan is to upgrade all 54 US PATRIOT fire-units with both the QRP and the PAC–3 improvements. This involves both radar/fire-control upgrades and fielding of the ERINT missile. Many of the Allies have purchased the near-term PATRIOT improvements and there have been extensive discussions with several of the allies with regard to the PAC–3 improvements.

Question. How do the radar and missile improvements in the PAC–2 program differ from those in the PAC–3 program?

Answer. The PAC–2 program was a series of improvements the PATRIOT missile first fielded in 1990 during Desert Storm to give the system a capability against Intermediate Nuclear Force Treaty compliant threats. The PAC–3 program builds on the PAC–2 effort and the lessons of Desert Storm to provide a more robust capability against the Desert Storm threat (Al Abbas, Al Hussein, etc.) and new threats such as the No Dong-1.

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The PAC–3 improvements will increase the capability of the system to simultaneously conduct surveillance, track targets and control missile engagements. The radar will also be given a greater capability to discriminate between closely spaced targets and debris. PAC–3 improvements will also provide for a separation of up to 30-km between the launchers and the radar. The PAC–3 missile (ERINT) provides critical additional battlespace and lethality against the Desert Storm and new longer range threats.

ERINT MISSILE

Question. The budget requests $58.5 million for ERINT. However, it also appears to include $170 million for ERINT in the Patriot line. a. How much is needed for the ERINT contract in fiscal year 1995? b. Why is ERINT funding requested in two places in the budget?

Answer. a. The combined PATRIOT/ERINT FY95 funding request is for $599.963 million. Of this amount the effort breakdown is as follows:

ERINT Missile:	
Dem/Val—Initiates PAC–3 missile risk reduction program	$58.460
EMD—Begin EMD missile hardware procurement/fabrication and conduct in-process reviews; hold SSR, PDR, and CDR to complete missile design; develop test plans and procedures for DT/OT/IOT&E flight test program	217.2
PAC–3:	
Dem/Val—Complete remote launch integration and testing; begin system integration of CDI Phase III software development; initiate TMD/THAAD integration/cueing program	69.240
Procurement—Remote launch mod kits; Radar Phase III mod kits; communications upgrade (RLRIU)	255.063

b. The risk-mitigation program is still being developed by the Army and the exact structure of this program is still under review. The current planned funding level for the risk mitigation effort is $58M. It is not a foregone conclusion that all, or indeed any, of the risk mitigation funding will go to the non-selected contractor.

Question. As you know, General, an OSD panel is reviewing the Army's selection process for ERINT. a. Explain the Army's process and rationale for selecting the ERINT over the Patriot for the PAC–3 mission. b. What is your opinion of the Army's selection process? Will it be upheld? c. What will be the impact of this delay on the ERINT schedule?

Answer. a. The ERINT missile was selected over the multi-mode missile as the PAC–3 missile based on a minimum needs determination. The Army developed an evaluation plan which established a Missile Review Board, composed of warfighters and engineering and scientific experts, and a Senior Review Council, comprised of senior Army and BMDO officials.

The missile review board evaluated both missile programs and presented their data and analysis to the Senior Review Council (SRC). The Missile Review Board did an extensive evaluation for over a one year period. They reviewed multiple independent cost estimates, risk analysis, performance measurement, and operational assessments. This effort expended over 700 manmonths of effort, conducting and reviewing approximately 934,500 simulations and 458 technical tests. The evaluation also considered the four Multimode and five ERINT test flights.

The SRC reviewed these results and made a recommendation to the Army Senior Acquisition Review Council (ASARC). The ASARC selected ERINT as the missile of choice. The critical selection factor centered on lethality against Theater Ballistic Missiles (TBMs) with warheads of mass destruction.

b. The Army did an extremely thorough review of the two missile programs and in my opinion they made the best choice for the Army and Nation.

Yes, I feel that this decision will stand up to any review.

c. The current schedule to achieve a FY 1998 first unit equipped requires a contract award in July 94. The schedule is achievable with the current Defense Acquisition Review Board (DAB) schedule of April 94.

Question. What are the milestones in the PAC–3 missile program?

Answer. The major milestones in the PAC–3 missile program are contract award in July 94, Critical Design Review (CDR) in Aug 95, first flight Sep 96, low rate initial production (LRIP) Jul 97, and First Unit Equipped (FUE) fourth quarter 98.

Question. How much is being requested to provide to the other contractor for a risk-mitigation PAC–3 multimode missile effort?

Answer. The risk-mitigation program is still being developed by the Army and the exact structure of this program is still under review. The current planned funding level for the risk mitigation effort is $58M. It is not a foregone conclusion that all, or indeed any, of the risk mitigation funding will go to the non-selected contractor.

THEATER HIGH ALTITUDE AREA DEFENSE (THAAD)

Question. THAAD (Theater High Altitude Area Defense) is being designed to intercept theater ballistic missile at long ranges and high altitude. THAAD includes missiles, launchers, communications equipment, and support equipment. BMDO is requesting $496 million for THAAD in fiscal year 1995. Please describe THAAD and the capabilities it will provide.

Answer. The Theater High Altitude Area Defense system will provide a capability for in-depth defense against tactical ballistic missiles with increased range and carrying chemical, biological and nuclear warheads. The most effective defense against hardened warheads is to intercept them at higher altitudes by a non-nuclear hit-to-kill missile interceptor. High-attitude interception of chemical and biological warheads destroy these warheads at extended ranges from the defended area. High altitude interception of threat nuclear warheads also negates the nuclear blast produced at lower altitudes, and dilutes detrimental nuclear radiation effects against targeted civilian populations.

Question. How would THAAD complement other theater missile defense systems such as Patriot and Sea-Based Upper Tier?

Answer. We are designing a defense architecture that has to cope with a wide range of threat ballistic missiles, along with the nuclear, chemical, and biological payloads they may contain. The military requirements for the defense are given to the Ballistic Missile Defense Organization by the Joint Chiefs of Staff and the Military Services. The Theater Missile Defense "Mission Need Statement," validated by the Joint Chiefs' Joint Requirements Oversight Council (JROC), specifies that we must create a defense in depth in order to keep our systems from being saturated. The JROC specifically set a requirement for U.S. forces to be able to attack ballistic missiles during all the phases of their flight—as they boost off the ground, as they ascend toward apogee, as they travel through their midcourse phase, and finally as they descend toward their intended targets. As a developer, the Ballistic Missile Defense Organization translates the military requirement into system and equipments that can do the job—within the constraints of costs, technology and other factors.

During Desert Storm in 1991, almost every American became familiar with PATRIOT. We have taken considerable steps since 1991 to modify and improve PATRIOT's ability to deal with the ballistic missile threat. Today, PATRIOT remains our only operational TBMD system. We have made and continue to make a significant investment in Theater High Altitude Area Defense (THAAD) and it's associated Ground Based Radar (GBR). THAAD will provide for intercepts farther out and at higher altitude than PATRIOT. THAAD will give us significant improved coverage in terms of defended area. But perhaps most importantly, THAAD allows us kill opportunities earlier in the flight of the TBM—more than one kill opportunity. By using THAAD as an Upper Tier, and PATRIOT or the Navy's SM–2 Block IVA Lower Tier interceptor together—we increase the numbers of kill opportunities and improve probability of kill (pk). Without the Upper and Lower Tiers used together we cannot meet our requirements because we do not have the defense in depth called for by the JROC—and that means much lower confidence in our ability to defend assets on the ground. There is another reason we need to use our Upper and Lower Tier systems in unison—the Lower Tier systems provide the defense against aircraft and cruise missiles which may also be part of the battle.

Question. Your budget justification indicates that the flight test preparation period has been extended for THAAD. How much did it slip and why?

Answer. THAAD is utilizing an event-oriented management to control the inherent risk associated with the accelerated THAAD program. The planned date for the first missile non-intercept test was delayed approximately one month. The perceived risk associated with proceeding with the flight test at the originally planned date caused the slip. Major areas of risk associated with the early flights include the integration and checkout of the missile components and the development and testing of the flight software. The schedules for these activities are continually being refined based on the delivery of the missile components and range integration activities. These inherent risks were amplified by the Los Angeles earthquake which disrupted the fabrication of the missile control system and the development of the BM/C31 software. The slip is felt to be a reasonable manifestation of the complexity of the THAAD program and the accelerated development schedule. The slip is not expected to impact the overall Dem/Val program schedule.

Question. Your development strategy includes building a prototype that would have 40 missiles, 4 launchers, 2 radars, and 2 communications centers in order to meet Congressional direction to field an advanced theater missile defense system by the mid-1990's. Last year you testified that this prototype would be fielded in 1996. Is that still the plan? How much will this prototype system cost?

Answer. The main THAAD Program objectives are to carry out Congressional guidance to develop an accelerated program to counter the ongoing widespread proliferation of long-range tactical ballistic missile systems. These objectives include the development of a User Operational Evaluation System (UOES) prototype system for fielding in 1996, while maintaining strict control of both the expenditure of allocated funds and the accelerated schedule for achieving initial full scale production of the THAAD objective system by Fiscal Year 2002. In order to field a prototype system as described, the THAAD program would have to exercise a contract option for 40 missiles. This option will not be exercised until all preliminary test data has been analyzed, and the missile design has stabilized to a high degree of certainty. Once the option is exercised, the THAAD contract allows 18 months for delivery of all 40 missiles, therefore some of the 40 missiles may not be delivered until 1997. The 40 missile option is estimated at a cost of $163M. Also, one launcher is being purchased for $1.66M. The remainder of the equipment (3 launchers, 2 radars. and 2 communication centers) are provided from the ongoing Dem/Val development and testing. Additional procurement is not required.

Question. Provide for the record a detailed description of how the fiscal year 1995 funds will be used, and an estimated total cost for this program.

Answer. The Dem/Val program (FY93 through FY96) is $1,661M. The FY95 costs are $496M ($412M for the prime contractor, $26M for government system test and evaluation, $58M for in-house, support contractors, OGA, and GFE).

FUTURE THEATER MISSILE DEFENSE PROGRAMS

Question. BMDO is developing three theater missile defense programs for the future. They are Sea Based Upper-Tier (Navy), Boost Phase Intercept (Air Force), and Corps SAM (Army). About $100 million is requested for the three systems in fiscal year 1995. BMDO is doing development to get the three technologies about even by 1998. Is this so that a downelection can take place then?

Answer. It is clear in our constrained fiscal environment that no more than one of our advanced capabilities can enter acquisition before late in the decade. Nevertheless, all three mission areas are important in the overall TMD architecture. I would prefer to characterize a potential decision in 1998 as a prioritization rather than a downselect. The ongoing development in each of these areas will provide the technical insight which will complement the joint user's operational requirement which will bear on a decision in FY98.

Question. On what basis would a downselection take place since the systems have very different capabilities?

Answer. The advanced concepts will be considered for a new start based on national priorities, operational need based on current and projected threat, and the technical maturity, capability, effectiveness, lethality, and affordability of each. Given that each advanced system provides unique or improved capabilities beyond that of our core programs, as they are not in competition with each other. The primary driver will be operational need, using requirements derived from the existing and projected threat as a basis. Additionally, achievability as measured by the technical progress that we make in each of these areas between now and 1998 will be important. Finally, affordability must be included as a factor in making a final decision.

Question. Doesn't this strategy set up a big battle between the services since each will have a system that fills unique capabilities?

Answer. There is always the potential for competition among the Services for scarce resources. Each Service currently plays an important role in our TMD program. The Army and Navy are primarily involved with development of interceptor systems, the Air Force is cueing and C3I, and the Marine Corps in upgrading current surveillance and missile assets. Individual programs will mature into a system of systems. The decision to acquire a new system to integrate into the defensive architecture will be made using the factors discussed above. Obviously, the decision made will reflect the judgment as to which best contributes to the defense of the entire theater.

Question. Provide a detailed breakout for the record on the cost of each project budgeted in fiscal year 1995 and the total cost for each project.

Answer. We anticipate that the decision to enter acquisition will be made by the Secretary of Defense on the recommendation of the Defense Acquisition Board. Certainly the Joint Staff, warfighting CINCs and the Services will provide input based upon the operational requirements for each system.

Programmed costs are shown in the table below. Note that total program cost will be addressed as part of the prioritization process. Total program cost must be briefed to the Defense Acquisition Board prior to making a decision to enter acquisition in 1998.

[Dollars in millions]

	FY95	FY96	FY97	FY98	FY99	Total
Corps SAM	17.7	30.6	33.4	36.5	39.1	157.3
Boost Phase	61.1	65.3	70.3	85.3	90.3	372.3
Navy Upper	17.7	30.6	33.4	36.5	39.1	157.3
Adv Capability	0.0	0.0	0.0	164.7	261.0	[1] 425.7

[1] Note.—These funds are earmarked for the system selected to enter acquisition in FY98. Funding would be used to begin the Demonstration and Validation (DEM/VAL) phase of the program.

Question. Your statement discusses a Commanders-in-Chief Theater Missile Defense Experiments program for theater programs. How much is budgeted for this program in fiscal year 1995?

Answer. $10 million is budgeted in FY95, FY96 and FY97.

Question. Provide for the record a detailed breakout of the cost of each experiment budgeted within this amount and its total cost.

Answer. A detailed breakout of costs for each experiment is not expected to be available until early July 1994. CINCs are currently preparing experiment plans and are due to respond to BMDO with FY 95 plans on 27 May 94. BMDO will determine the required resources to execute the proposed experiments. We expect participation from USACOM, USCENTCOM, USEUCOM, USFK, and USSPACECOM. If each of these participate, the requirements will exceed the budgeted $10 million.

Question. Which theater systems are included in this program?

Answer. The CINCs TMD Experiments Program addresses three pillars of TMD, BMC3, active defense and attack operations.

BMC3. All of our experiments have been primarily BMC3 oriented. (Passive Defense) The program has explored the utility of early warning systems TALON SHIELD, TACDAR, and STU–3 Voice. The program has experimented with inter-theater early warning distribution using theater networks and JTIDS. The program has examined the utility of many different tactical information processing and display systems to include the Air Defense Systems Integrator (ADSI), the Standard Tactical Receive Equipment Display (S–TRED), and the Warrior Terminal. The experiment program has assisted the CINCs in developing BMC3 architectures for the experiments and for real world contingencies.

Active Defense. The experiment program has examined the utility of air defense command posts for the ADA brigade and PATRIOT battalion. The program has also examined the utility of systems for air and missile defense planning and command and control. The experiment program has examined the utility and feasibility of establishing common links between the PATRIOT and AEGIS to establish a shared air picture.

Attack Operations. The experiment program has examined the capability of joint forces to exchange targeting information and use targeting information from both national and theater sensors. The program has explored the suitability of terrain analysis software to predict where missile launchers will operate and analyze their movement after firing. The experiment program has examined the utility of employing a TMD Cell with the mission of fuzing TMD target information to assist in rapid service of TBM related targets.

Question. What is the goal of the Experiments program?

Answer. The primary goal of this program is to improve existing theater missile defense capabilities and simplify the eventual integration of missile defense into theater warfighting doctrine, training and operations. The program strives to cause TMD to become part of everyday business for the CINCs. The program helps to defray some of the cost of including TMD in CINC exercises and helps to establish a training support package that the CINCs can use on a regular basis. The program serves to enhance the CINCs awareness of TMD as a tactical mission that must be part of every tactical operation. If the CINCs are required to fight today, they will employ the equipment, BMC3 architectures, and tactics they use during these experiments.

The program explores new concepts and technologies to determine if they can be used to enhance existing TMD capabilities. The program also integrates, when possible, tomorrows capabilities to ensure that BMC3 architectures and connectivities will support the employment of these capabilities.

The program collects operational data that is useful to the CINCs, BMDO, the material developers, and supporting agencies. As most of the experiments are performed as overlays on existing CINC exercises, the experiments produce operational data that cannot be replicated in a laboratory.

BOOST PHASE INTERCEPT

Question. OSD is proposing a Boost Phase Intercept demonstration program. Why is OSD getting involved in this program?

Answer. After completion of the BMDO Boost Phase Intercept Study, USD(A) requested recommendations on how to pursue a BPI technology demonstration. The USAF proposed an immediate program using existing technologies, the Short Range Attack Missile (SRAM) and Lightweight Eso-atmospheric Projectile (SRAM/LEAP). This concept would have focused upon an ascent phase (API) system, where TBMs were to be intercepted in space. The SRAM/LEAP program would have exhausted all funds earmarked for maturing BPI technology. BMDO supported the SRAM/LEAP, but due to limited resources could not support separate API and BPI programs. Mr. Deutch, at that time USD(A&T), directed formation of a joint OSD/BMDO/USAF/USN Study Panel to assess API and BPI options. The Panel recognized the significant payoff potential of intercepting during boost phase to ensure negation of TBM-deployed countermeasures and deter use of weapons of mass destruction (WMD) by causing shortfall of debris on, or close to, enemy territory. They recommended that BMDO could invest in a joint BPI technology demonstration program and Mr. Deutch directed BMDO to prepare such a program and coordinate with his staff.

Question. Why was Boost Phase Intercept selected for this special demonstration effort when the Bottom-Up Review emphasizes navy Upper—Tier?

Answer. Selection of BPI for a technology demonstration was not associated with the decision to delay start of a fourth Core Program element.

With limited technology demonstration funds, the issue becomes, which mission area (BPI, Navy Upper Tier, Corps SAM) would benefit most from limited technology investment. I am proposing to go forward with a technology demonstration for BPI, as well as modest investment in Navy Upper Tier and Corps SAM. This is not to be interpreted as a decision to proceed with a favored system at this time.

All three mission areas are important. Of the three, BPI warrants the most study in technologies and operations concept maturation. Further, BPI may provide a very high payoff as the only effective counter to TBM-deployed countermesures. BPI also has the unique potential to cause weapons of mass destruction (WMD) debris to fall on enemy territory, a possible strong deterrent. By contrast Navy Upper Tier and Corps SAM are conceptually more mature and will leverage technologies from the existing Core programs and/or planned technology demonstrations (i.e., Terrier/Leap). The technologies matured in the BPI demonstration may also support Navy Upper Tier and Corps SAM, i.e., the endo/exoatmospheric kill vehicle and the overhead theater airborne sensor.

Investment in the BPI demonstration, and continued support to Navy Upper Tier and Corps SAM will ensure a technically sound assessment and will support a future decision (FY 1998) regarding which system will proceed into the formal acquisition process.

Question. The Air Force is requesting $79 million for Boost Phase Intercept. What are BMDO's responsibilities vs. the Air Force's responsibilities for Boost Phase Intercept?

Answer. The objective of the BPI technology program is to demonstrate the kill of a theater ballistic missile during boosted flight by an air launched interceptor supported by an off board sensor to detect, track and provide in flight updates of predicted target position. The jointly funded BMDO/AF demonstration will exploit interceptor and sensor technology in development under BMDO sponsorship, as well as current USAF/USN counter air assets to demonstrate this capability. In general, BMDO technology funding will support the development and flight test of the interceptor; Service funding will be used to refine the concept of operations (CONOPS), perform necessary modifications for aircraft integration and modify off board sensors as required.

Question. Last year, the Air Force indicated two problems with the program—the airborne laser component and the use of kinetic energy technologies for Boost Phase Intercept. Could you explain these problems and whether they are resolved?

Answer. The airborne laser program was transferred to the Air Force in 1993. We would suggest that you ask this question of the Air Force. In prior BMDO work we identified two major technical issues in using aircraft-based systems to destroy a ballistic missile before it burns out in the boost phase. For kinetic energy intercept during boost phase, the defending missile needs very high velocities to reach the thrusting ballistic missile before burnout. Directed energy weapons offer near-zero time of flight but require complex phase compensation to counteract the degrading effects of propagation through the atmosphere when carried on aircraft platforms. Boost-phase intercept continues to be a high payoff way to defend against ballistic missiles and achieving this capability is a major goal of our advanced technology programs such as the space-based laser.

BMDO has significantly advanced the state-of-the-art in kinetic energy interceptors by developing lighter weight sensors which allow relatively higher fly-out velocities. We expect to achieve by FY 1998 technology demonstration of the kind of agile, high velocity interceptor needed for significant improvements in boost phase intercept capabilities.

Question. If Boost Phase Intercept becomes viable and missiles are intercepted near their source, why do we need the THAAD and Patriot systems that wait for the missile to get close to us before we intercept it?

Answer. It is not expected that BPI will provide the levels of protection effectiveness provided by THAAD and PATRIOT. A layered defense provides the capability to engage those reentry vehicles (RVs) which might pass through any of the layers. THAAD and PATRIOT would defend against those survivors which made it through the Boost Phase of defense. BPI has the potential for providing the first layer of defense in-depth against TBMs. it must be understood that BPI is a technology effort which will not achieve proof-of-principle before FY98. Certainly, as Secretary Aspin has said, "the threat is here and now," so the need for theater missile defense can be satisfied in a more timely manner by the "core" systems.

NAVY UPPER-TIER PROGRAM

Question. What are BMDO's plans for the Navy Upper-Tier program in fiscal year 1995?

Answer. BMDO believes there is the potential to provide tremendous overland TBMD from the Navy's AEGIS ships by developing Navy Upper Tier. By relocating AEGIS ships already routinely deployed, and positioning those ships closer to the TBM launch point than is normally practical for our systems such as THAAD and PATRIOT (which are positioned near what you want to defend, not near the aggressor's launch point) dramatic overland coverage can be achieved. An example of this would be an AEGIS ship stationed in the Sea of Japan capable of engaging a North Korean No-Dong missile targeted at Japan. The AEGIS ship would, in this scenario, get the first kill opportunity from international waters. Next, THAAD would get a kill opportunity closer to the target. Finally, PATRIOT would get a kill opportunity. This defense in depth is defined in the JROC approved Mission Need Statement for theater ballistic missile defense (TBMD).

One of the reasons this sea-based capability is so important is the inherent mobility and flexibility of the ships. THAAD and PATRIOT airlift and sealift requirements complicate the deployment plan of the Commander-in-Chief (CINC) during a crisis. Sea-based TBMD alleviates some of the airlift and sealift difficulties by providing the CINC additional flexibility in deployment timelines for introducing land-based TBMD systems into the theater. Sea-based forces arrive in theater early and can protect ports of entry, airbases, etc. during the initial phases of the conflict.

Under the current BMDO plan, we are evaluating future alternative TBMD systems. The three systems we are looking at for future development are Corps SAM, Sea Based Theater Wide (upper Tier), and Boost Phase Intercept. Because the BMDO is funding constrained, we do not see a way to initiate any one of these alternatives before FY 98.

In FY 1995 we intend to work closely with the Navy to continue to evaluate and study potential material alternatives for interceptors and kill vehicles, including LEAP, THAAD, and the other alternatives. We intend to fully evaluate the TERRIER–LEAP missions—two of which will occur later this year. And finally, we want to be in a position to commence a Cost and Operational Effectiveness Analyses (COEA) and Dem/Val by FY 1998.

The funding for these systems between FY 95 and FY 98 allows us to continue to develop the concepts, do studies and analyses critical to fulfilling the requirements of the DoD acquisition process.

Our anticipated funding of Sea Based Theater Wide (upper Tier) specifically calls for continuation of THAAD–AEGIS compatibility studies (allowing continuing evaluation of the potential to add a THAAD to the Sea Based AEGIS system), evaluating the technical data collected completing the TERRIER–LEAP flight tests in FY 94, and doing trade studies and analyses to support decision making. We believe that THAAD, LEAP or other kill vehicle options can be added to the AEGIS Weapon System to provide a mobile Sea Based Theater Wide capability that would provide dramatic overland TBMD protection that would complement the AEGIS ships' robust anti-cruise missile capability. The funds requested for the Navy Upper Tier program within the FY95 President's Budget are:

FY95	17.7
FY96	30.6
FY97	33.4
FY98	36.5
FY99	39.1

Total program development cost is dependent upon the interceptor chosen and the amount of work necessary to change or modify the kill vehicle to be compatible with the existing systems (AEGIS, VLS, etc).

Question: Would you characterize the Navy Upper-Tier program as in a holding pattern for fiscal year 1995?

Answer. The President's Budget outyear funding limitations provide for only one new start to occur in FY98. The Navy Upper Tier, Boost Phase Intercept and Corps SAM are the candidates for that new acquisition program. None of the program goes into a holding pattern before the '98 decision. The Navy Upper-tier program has not yet been defined, the required cost and operational effectiveness analysis has yet to be initiated, let alone completed, and the technical trades between several missile interceptor candidates have not yet been established. All of these and many other projects will be executed in '95 and outyears.

Question: Last year, BMDO was considering two different options for Navy Upper-Tier—the Standard Missile with a Lightweight Exoatomospheric Projectile (Leap) and marinized THAAD. Are these still the options being considered? What are the pros and cons of these options?

Answer. When assessing the merits of various upper tier candidates it is important to consider the operational content within which each system has been optimized. THAAD and LEAP are distinctively designed for varying missions. The Army's THAAD has been optimized for use in terminal missile defense. The Navy envisions the greatest payoff for the Nation by pursuing an upper tier capability that capitalizes on the mobility of the AEGIS system in positioning itself for ascent engagements against theater ballistic missiles. Providing this capability will require increasing interceptor velocities over that of the current THAAD design.

Question: Are other options being considered for Navy Upper Tier? Are you considering interceptors other than LEAP such as the Atmospheric Interceptor Technology (AIT) that could be used inside or outside the atmosphere?

Answer. Yes. We have not ruled out any of the promising interceptor technology development efforts as candidates for Upper Tier.

As previously discussed, we continue to conduct engineering analysis, studies, and modeling to determine the potential for integrating THAAD technology into the Upper Tier program. Advanced Interceptor Technology is likewise still a candidate under consideration.

Question. How many LEAP tests have been performed to date? How many tests have been against targets and what were the results?

Answer. Since 1989 we have been engaged in a series of hover tests for the LEAP vehicles. This allowed us to evaluate different contractors' designs in flight. These tests use an infrared (IR) target to test the LEAP attitude control system and the focal plane array. We've also recently had success incorporating solid divert rocket motors into our LEAP designs—a factor that adds safety in the maritime environment (the Navy does not ordinarily permit liquids with the properties of LEAP divert fuel on ships at sea). We have had two very successful launches from ships at sea to prove the concept of LEAP deployment in the exoatmosphere after an at-sea launch. This summer BMDO has scheduled the first at-sea launch of a LEAP with a target intercept planned into the mission. In summary, we've had an ongoing program that employs a "build a little test a little" concept minimizing risk as we resolve critical technical issues.

Question. What do you hope to show from the LEAP tests planned for later this fiscal year that use a Standard Missile Block 3 fired from a Terrier cruiser?

Answer. We plan to achieve a LEAP intercept of a target. These next two TERRIER–LEAP missions will afford BMDO an opportunity to demonstrate LEAP vehicle performance. Hover tests demonstrated the capability for LEAP to acquire an IR target and to fire the divert engines to position itself for a kill. These missions will show us the LEAP in operation acquiring the target, and obtaining in intercept.

Question. Does BMDO plan any Navy Upper-Tier tests in fiscal year 1995?

Answer. No. BMDO does not have sufficient resources to support another flight after the two scheduled for FY 94.

Question. Provide a breakout for the record by program element and fiscal year for the total Navy Upper-Tier program and each project within it.

Answer. Program Element: 603216C; Project Number: 1216.

Sea-based theater-wide defense

FY95	17.7
FY96	30.6
FY97	33.4
FY98	36.5
FY99	39.1
FY95–99	157.3

CORPS SAM

Question. Corps SAM would be similar to the Patriot system, but it would be more mobile and have more missiles. It would replace the current Hawk missile system and protect Army and Marine maneuver forces. BMDO is requesting $17.7 million for Corps SAM in fiscal year 1995. The Bottom-Up Review suggests deferring major work on Corps SAM until fiscal year 1998. Is this consistent with your plans for Corps SAM in fiscal year 1995?

Answer. Yes. The concept studies and analyses for the Corps SAM concept definition phase have been completed and the program was ready to proceed to a MS I decision review in Sep 93. However, the BUR results that were released in Sep 93 stated that major work on Corps SAM could be delayed until FY98. Therefore, we have adjusted the acquisition strategy to select up to two contractors to conduct a concept development effort from which a single Corps SAM solution will be selected and brought to a MS I decision review in 1998.

Question. What is the status of Germany's participation in the program with the U.S.?

If Germany does not participate, what will happen to Corps SAM? What is the proposed cost-sharing arrangement?

Answer. The German government is reviewing both the U.S. Corps SAM and the French SAMP-T medium range missile systems for compatibility with their TLVS system. The United States has indicated its strong interest in working with Germany on a co-development programs. The Germans have not decided which system best satisfies their military and political requirements

If Germany does not choose to participate with the U.S., then Corps SAM will continue with its scheduled acquisition plan.

There have been preliminary discussions of cost-sharing options with the Germans, but no plan developed at this time. If the Germans decide to work with the U.S., then specific funding and burden-sharing arrangements will be negotiated according to DoD regulations.

Question. Does Corps SAM have a high priority to the Army? If so, why does it have a low priority to BMDO?

Answer. CORPS SAM does have a very high priority with the Army and the Marine Corps. Both Services agree that it is critical to provide protection of maneuver forces from aircraft defense, shorter TBM and cruise missile attacks. CORPS SAM, as one of three advanced concepts, is a high priority program for BMDO as well.

Within TMD, the BMDO has identified "Core" programs to be implemented in the near-term. These are PATRIOT PAC-3, Navy Lower Tier THAAD/GBR, and TMD BMC3I. As the "Core" programs, they have the highest priority. The future systems, Corps SAM, BPI, and Navy Upper-tie, will be prepared for acquisition in 1998 based on availability of funds, operational requirements and national priorities.

ARROW MISSILE

Question. BMDO supports a cost sharing technology program with Israel which will lead to Israeli development of the Arrow theater missile defense system. BMDO is requesting $52 million for the Arrow program in fiscal year 1995. How many Arrow I missile demonstration tests have been conducted? What were the results?

Answer. Six Arrow I missile tests have occurred to date. Four tests were conducted under the Arrow project. The first missile was inadvertently destroyed by the range safety office and the next two suffered inflight failures. The final test under the Arrow project was a fly-out (no target) and achieved its objectives. Two tests have been completed under the Arrow Continuation Experiments (ACES) project. Both of the last two interceptor missiles passed within lethal distance of the target missile, but the fuzing device failed to detonate the warhead.

Question. What is the status of Arrow II missile development?

Answer. All subsystem critical design reviews have been completed. Hardware is being fabricated. Ground tests are underway and flight tests will begin later this year.

Question. Is fiscal year 1995 the last year of the Arrow program?

Answer. FY95 is the last year for which funds have been programmed for ACES. ACES is a firm-fixed-price contract with payment based on completion of performance milestones. It is expected that contract performance will continue into FY96 because of schedule delays caused by flight test difficulties. Final milestone payments will therefore occur in FY96. This delay in milestone payments will not increase obligations to the U.S. Government.

Question. Will Israel be able to go into engineering and manufacturing production after 1995?

Answer. ACES is an accelerated program and for the Israelis the program serves as the EMD phase for the missile and launcher. The Arrow Deployability Initiative authorized by Congress in FY94 will serve as the final development test phase for ACES prior to their production of the system. The Arrow Deployability Initiative is planned to begin long-lead purchases in FY95 for integrated Arrow System tests that will integrate the U.S.-Israeli cooperatively developed missile and launcher and the Israeli developed fire control radar and battle management center.

[CLERK'S NOTE.—End of questions submitted for the record.]

TUESDAY, APRIL 12, 1994.

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, ARMY

WITNESSES

LT. GEN. WILLIAM H. FORSTER, USA, MILITARY DEPUTY TO THE ASSISTANT SECRETARY OF THE ARMY FOR RESEARCH, DEVELOPMENT, AND ACQUISITION

MAJ. GEN. RONALD V. HITE, USA, DEPUTY FOR SYSTEMS MANAGEMENT AND INTERNATIONAL COOPERATION

MAJ. GEN. JAY M. GARNER, USA, ASSISTANT DEPUTY CHIEF OF STAFF FOR OPERATION AND PLANS, FORCE DEVELOPMENT

INTRODUCTION

Mr. MURTHA. The Committee will come to order. The Committee is pleased to welcome Lieutenant General William H. Forster, who is the Military Deputy to the Assistant Secretary of the Army for Research, Development, and Acquisition. The fiscal year 1995 budget request is about $5.3 billion for Army Research, Development, Test, and Evaluation, slightly less than the $5.4 appropriated last year.

Your full statement will be placed in the record. Please briefly summarize it for us now.

SUMMARY STATEMENT OF GENERAL FORSTER

General FORSTER. Thank you. Mr. Chairman.

I will insert my statement for the record. Let me sum up a bit about where we are in our R&D program.

As you recall, I briefed you last year on the Army modernization, which had put things in terms of the capabilities that a modern Army has to have to project and sustain the force, protect the force, win the battlefield information war, conduct precision strikes and dominate the maneuver battle based on a changing world environment and a reduced target that says we will have more soldiers in CONUS. We have to project that force overseas and make our light forces more lethal and make heavy forces more deployable.

We have followed that as we start working our 1996 to 2001 Program Objective Memorandum (POM).

The programs that do well, we want to keep in R&D and continue to fund are those that fit in these categories or in more than one category; for example, the Comanche reconnaissance helicopter. We are following that along.

In the future, we don't see much change. We will continue to look at what it takes to have these five capabilities in our Army and the programs that support that are the ones that are going to get funded.

In a time where we make difficult choices, this is, we think, the right way to make those choices. In the near-to-mid-term, we are building on the success of our Abrams tanks, Bradley Fighting Vehicles, Apache attack helicopters, and M109 Howitzers, putting most of our efforts into upgrading those systems so that we can avoid the upfront costs of new weapons platforms, when what we have now is good enough for the near-to-mid-term.

Most upgrades involve digitization and winning the information war by putting compatible modems and data transmission devices in each combat vehicle so that Longbow Apaches can send pictures and enemy location to tanks, to the command and control vehicle so that commander can focus all of his assets on one objective.

When you do that, you get more of your weapons in the fight and smaller forces become as lethal as larger forces.

As we speak, we are doing our Advanced Warfighting Experiment at the National Training Center in which we have 121 digitized platforms out exploring and testing this concept.

We have Apaches with airborne target handover systems talking back and forth. We have modified the M1A2 tank to receive this data so that airborne target information can go to the tanks.

We have upgraded Bradley prototypes working with the tanks sharing data back and forth over the inter-vehicular information system, all flowing back into the command and control system for the commander to look at.

We started that Sunday, don't have any results to give you except that things are working and we invite you to come to the National Training Center and observe it within the next two weeks if you can.

We are going to learn a lot. We are out there trying to find out what it is we know and what we don't know so we can focus on getting on with it.

In the longer term, we need to bring a long developmental project that will bring new technology to the Army for the 21st Century.

We are focusing on Comanche, the RAH-66 armed reconnaissance helicopter; the Advanced Field Artillery System and its armored resupply vehicle; a couple of theater missile defense systems—Corps SAM, a maneuver surface-to-air missile with good capability against short-range Tactical Ballistic Missiles (TBMs) and cruise missiles and THAAD, theater high-altitude air defense system for defense against TBMs; and Brilliant Anti-armor Submunitions, or BAT.

All will be available in the later nineties, early next century and they take information a step further and turn it into knowledge with signature, management, techniques, reduced detectability, more automatic firing capabilities in the case of the TBM systems, better target discriminators and a better way to fuse data among them.

They take us to the next level. They also carry the technology that we will use in everything else we buy in the early 21st Century.

Comanche has all of the capabilities as far as advanced sensors, advanced processing that you would see in the next upgrade to Apache or any follow-on helicopter.

The Advance Field Artillery System does the same thing for armored vehicles, advanced chassis capability, a three-man crew with automatic loading capability where it cuts the size of the artillery crew in half.

These are more than just individual programs. They are technology carriers for what we want to do in the future. That capsulizes our plans of near- and mid- and long-term and how we have focused the R&D program.

I would be pleased to answer your questions now, Mr. Chairman.

[The statement of General Forster follows:]

RECORD VERSION

STATEMENT BY

LIEUTENANT GENERAL WILLIAM H. FORSTER

MILITARY DEPUTY TO THE

ASSISTANT SECRETARY OF THE ARMY FOR

RESEARCH, DEVELOPMENT AND ACQUISITION

BEFORE THE

SUBCOMMITTEE ON DEFENSE

COMMITTEE ON APPROPRIATIONS

UNITED STATES HOUSE OF REPRESENTATIVES

SECOND SESSION, 103RD CONGRESS

UNITED STATES ARMY RDT&E, FISCAL YEAR 1995

12 APRIL 1994

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INTRODUCTION

Mr. Chairman and Members of the Committee, thank you for the opportunity to appear before you to discuss the proposed Fiscal Year 1995 (FY95) research, development, test and evaluation (RDT&E) budget for the United States Army. It is a privilege for me to again represent the Army leadership, the civilian and military members of the Army acquisition work force, and the soldiers who rely on us to provide them with world-class weapons and support equipment to deter conflict or to fight and win our nation's wars decisively with minimum casualties.

Today's Army is the premier land force in the world. We take great pride in knowing that our soldiers have the most technologically advanced warfighting systems. Our men and women are trained, ready, and well-equipped. This would not have been possible without the help and support from Members of this Committee. As representatives of the American people, you have strongly supported our programs and guided them to fruition. I believe the Army has been a good steward of the resources provided, but our success would not have been possible without your advice and support.

It is imperative that we sustain modernization -- in the near-term and the long-term. If not, our technological advantage over potential adversaries will diminish over time and increase the risk to our soldiers. We cannot let this happen as we change today's Army into a 21st century Army -- Force XXI. Continuous modernization is one of the keys to dominance on the future battlefield and the key to readiness for unexpected challenges of the 21st century.

In FY95, our RDT&E request of $5.3 billion totals about 15 percent of the overall DoD RDT&E budget request and about nine percent of the Army's total budget request of $61.1 billion. Of the $5.3 billion, $1.3 billion is for core Science and Technology (S&T) --

the basic research and development efforts that lead to new concepts and leap-ahead capabilities in the future. The DoD budget emphasizes S&T programs, and the DoD goal is to have core S&T funding keep pace with inflation even as the DoD total budget declines in real terms. Because of overall budget limits, the Army S&T program does not meet this goal for exploratory development ($563 million in FY95) and advanced development ($516 million in FY95). Only basic research ($214 million in FY95) is funded at zero percent real growth in FY95 as compared to FY94. This restricts our ability to conduct Advanced Warfighting Demonstrations and Experiments and to mature new concepts; however, other near-term readiness and modernization requirements limited our S&T for FY95.

The remainder of the RDT&E request consists of demonstration/validation (DEM/VAL) ($409 million in FY95), engineering and manufacturing development (EMD) ($1.7 billion in FY95), management support ($1.2 billion in FY95), and operational system development ($652 million in FY95). DEM/VAL and EMD capture efforts for advanced development and engineering of systems with well-defined objectives. Management support encompasses research and development (R&D) efforts directed toward supporting installations or operations required for general R&D use. Included are operations and support costs for test ranges, operational testing, minor construction, maintenance and repair, and scientific, technical and management information activities, as well as civilian salaries, travel, supplies, services and other expenses required for performance of RDT&E functions at RDT&E commands. Operational systems development captures R&D costs associated with activities that change the performance envelope of systems that are in production or fielded.

Although our RDT&E budgets have not suffered the declines of our procurement accounts, we are seriously concerned about long-term modernization. The Army Chief of Staff, General Gordon Sullivan, has stated that declining resources and increasing missions are "pushing the Army along the razor's edge of readiness." I cannot echo this too loudly.

The Chief of Staff knows firsthand that we have taken our modernization accounts to the minimum and that we have extended the "razor's edge of readiness" into the future. The delicate balance between the demands of training and operations today and the need to invest in the future has been maintained in the past, but as we reshape the Army into a smaller, but versatile, power projection force, modernization programs remain essential. Our actions this year will influence the readiness of the force for the next 15 to 20 years.

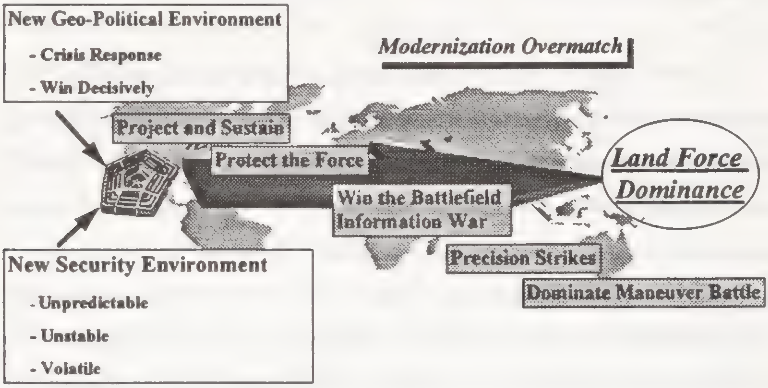
MODERNIZATION VISION

The world today is complex and ever-changing. The Army missions and responsibilities continue to grow, and include worldwide disaster and humanitarian relief, peacekeeping and counter-drug operations as well as training and equipping for combat. The profound change in the world order has presented us with new challenges. There are numerous danger zones; the most urgent being instability on the Korean peninsula with its unknowns regarding nuclear weapons development. Our smaller Army of the future must be more versatile, more deployable to more locations, sustainable in more different environments, and as capable as in the past to carry-out the missions assigned us.

In the past, the Army focused on the development and production of systems, our "Big Five:" Abrams tank; Bradley fighting vehicle; Apache attack helicopter; Black Hawk medium lift helicopter; and Patriot air defense system. All have been combat tested. All are proven successes. Today, we cannot afford another "Big Five" for the future. The Army objective in the near to mid-term is improving the capabilities of the "Big Five" and other fielded systems. The rate of improvement versus cost in firepower, mobility, and protection upgrades has leveled out and investments with the largest near-term payoffs will come from the integration of information technologies to improve these existing systems. Our objective for the mid to long-term modernization is to focus technological advancements in a few key new systems developments -- the "Future Five." These are:

RAH-66 Comanche armed reconnaissance helicopter; Advanced Field Artillery System/Future Armored Resupply Vehicle; Brilliant Anti-Armor Submunition; Theater High Altitude Area Defense system; and Corps Surface-to-Air-Missile. These systems will carry the technology forward for a subsequent generation of combat vehicles, vertical lift aircraft, and missiles beyond the year 2000.

Modernization Vision

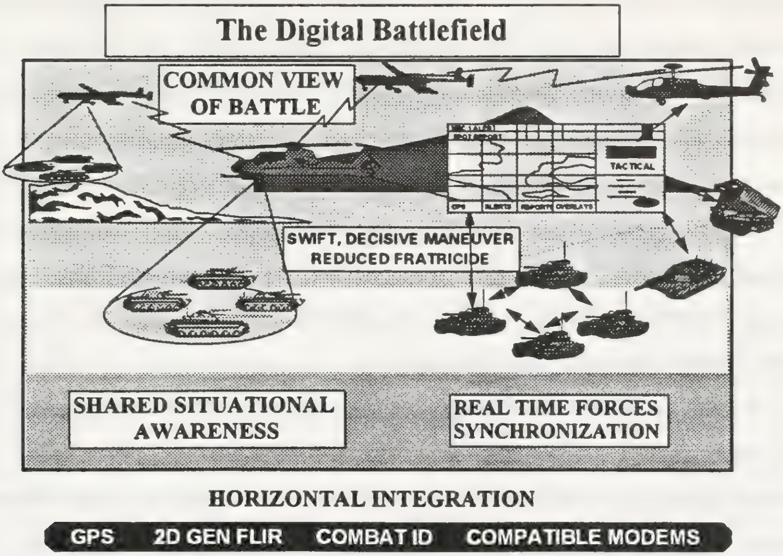


THE ARMY MODERNIZATION PLAN

In these changing and highly uncertain times, we have a plan to modernize America's Army and take it into the 21st century. Our blueprint for meeting the challenges of the post-Cold War world details a continuous modernization strategy to ensure that we maintain the capabilities necessary to protect our nation's interests and to achieve land force dominance over potential adversaries.

The smaller our Army becomes, the more modern and technologically overmatching it must be. If we do not dominate our enemies in the future as we do now, we may still win -- but at the price of far more American casualties, and with the risk of a far longer campaign that will burden our resources and our citizens. The Army modernization strategy recognizes the unpredictability of the where and when of "two near-simultaneous major regional contingencies" and the fact that most of our forces will be stationed in the continental United States (CONUS). Therefore, we place priority on five areas of technological superiority where the Army must maintain its technological edge. These five areas are: Win the information war; Dominate maneuver; Conduct precision strikes; Protect the force; and Project and sustain combat power.

The modernization vision is only a little more than one year old; yet, it is working well. We don't foresee substantive near-term changes. Let me update each area and highlight the key RDT&E programs required to maintain our decisive edge.



Win the Information War. Information is power. On the battlefield, information is deadly power. A key factor in modern warfare is the ability to collect, process, disseminate, and use information about the enemy while preventing him from obtaining similar information about our forces. In short, we must destroy, disrupt, and control enemy information sources and distribution while ensuring our commanders get accurate and relevant data in time to use it. Digitizing our battlefield systems; in other words, equipping them to transmit, receive, and display digital data, is fundamental to winning the information war. Digital data networks allow rapid sorting and sharing of critical battle information throughout the battlefield. This technology allows the commander to see the battle through the sensors of his reconnaissance helicopters, scouts, tanks, and direct fire systems and better coordinate his forces by sharing his view of the battlefield and his objectives with these same tanks, fighting vehicles, artillery, command centers, and attack and reconnaissance helicopters. The system is based on standard protocols and formats, allowing map overlays and friendly and enemy locations to be passed in near real-time to every key system in the combined arms task force -- as well as to higher headquarters and adjacent commands. The importance of this capability is clear: the commander spends less time figuring out where his forces and the enemy are, and more time concentrating force on an objective understood by every member of his task force. The Office of the Secretary of Defense (OSD) recognized the power of this concept and provided additional funding beginning in FY96 to speed the Army's digitization process. We established the Digitization Special Task Force to develop an operational architecture and institutionalize battlefield data requirements by this summer.

The digital battlefield does not end with upgrading present weapons systems. Warfighters and command centers will be linked digitally through advanced modems to emerging systems like the Joint Surveillance Target Attack Radar System (Joint STARS), satellite communications relays, and RAH-66 Comanche helicopters in order to provide commanders and their staffs with a shared picture of the battlefield and combat crews with more effective situational awareness.

In practical terms, this will allow the RAH-66 Comanche to share its sensors' view of the battlefield with artillery fire support elements, with M1A2 Abrams tanks and upgraded Bradley fighting vehicles, allowing direct synchronization of fire and maneuver in real-time -- speeding the tempo of the battle while minimizing both overkill and fratricide.

The Army's primary development system to ensure that our soldiers have the information advantage in the Information Age is the RAH-66 Comanche armed reconnaissance helicopter, currently in DEM/VAL. In FY95, we will complete the first prototype, conduct ground and static tests, and, in late FY95/early FY96, conclude the Comanche's first flight. Fielding of this system takes on greater importance with each passing day. Comanche is critically important to winning the information war, but let me hasten to add that the Comanche is important to the other four modernization areas as well. In fact, it is vitally important to the Army's overall effectiveness. During Operation Desert Storm, our ground commanders never got the near real-time battlefield information they needed to make the best tactical, timely decisions on the employment of battlefield forces. Comanche will correct this most critical deficiency with greatly improved night/adverse weather reconnaissance and target acquisition, deep reconnaissance without detection, survivability, and deployability.

Let me briefly list the capabilities of this revolutionary helicopter under the remaining four modernization areas. (1) The Comanche's capabilities in extended range operations, low observability, target recognition, digitized communications as well as its ability to quickly respond to a "mission divert" makes it a superior vehicle for deep "precision strike" missions against time sensitive targets -- especially targets so dangerous they must be confirmed killed or reengaged. (2) Comanche provides strategic agility to "project and sustain" (rapid inter/intra-theater deployability) with technical superiority that gives the maneuver commander a decisive force on the battlefield worldwide. Its self-deployment range of 1,260 nautical miles is sufficient to self-deploy from CONUS to Europe, Africa, and the Middle East, and it will require significantly less maintenance support than today's helicopters: (3) Comanche will "dominate maneuver" by developing the situation, providing security, maneuvering rapidly across the battlefield and synchronizing all available weapon systems on the digitized battlefield. Designed for rapid rearm, refuel, and repair, the Comanche will increase the operational tempo. (4) The Comanche will reduce the potential for fratricide and "protect the force" through its advanced electro-optical sensors, aided target recognition and sensor/weapons integration. Its night/adverse weather air defense capabilities are unmatched as is its capability to conduct armed reconnaissance and provide early warnings in all conditions to include day/night/adverse weather. It is clear that Comanche is tailor-made for the new world order. First Unit Equipped (FUE) is scheduled for FY02.

In FY95, the Command and Control Vehicle (C2V) program will complete prototype vehicle design and fabrication in preparation for operational and technical testing. FUE is planned for FY98. The need for the C2V was confirmed during Operation Desert Storm when the lack of a survivable command post vehicle capable of keeping pace with the Abrams tanks and Bradley Fighting Vehicles was identified as a critical operational deficiency. C2V will be a fully tracked, armored vehicle that will ensure a mobile, responsive, and survivable command and control capability for armored forces. The C2V will provide battalion-through-corps-level command and control capabilities in support of mobile operations through integration into the vehicle of Army Battle Command System (ABCS) components. ABCS integrates Army command and control programs at all echelons from strategic to brigade and below, including the Army Tactical Command and Control System (ATCCS).

ABCS is essential to realizing the joint interoperability goal of the Command, Control, Communications, Computers, and Intelligence (C4I) for the Warrior concept.

Under the ABCS umbrella, R&D continues on the evolutionary acquisition of ATCCS which is key to providing commanders in the Army's corps and divisions data to synchronize and direct their forces more effectively.

ATCCS consists of interoperable automation systems supporting the five Battlefield Functional Areas (BFAs): Maneuver Control System (MCS) supporting the Maneuver BFA; Advanced Field Artillery Tactical Data System (AFATDS) supporting Fire Support; Forward Area Air Defense Command and Control (FAADC2) supporting Air Defense; All Source Analysis System (ASAS) supporting Intelligence/Electronic Warfare; and Combat Service Support Control System (CSSCS) supporting the Combat Service Support BFA. These systems assist the force commanders in processing information within the BFAs, planning and controlling operations, and exchanging information horizontally across the BFAs and vertically from battalion to Echelons Above Corps (EAC). ASAS, for example, provides commanders direct access to strategic and Joint intelligence. Three ATCCS systems -- CSSCS, AFATDS, and FAADC2 Heavy -- are scheduled for Milestone III Production Approval decisions and FUE in FY95. The ASAS program will leverage its R&D activities by infusing already fielded Block I systems with technology and functional upgrades flowing from the ASAS Block II development contract.

The CONUS-based power projection Army has become more dependent on Military Satellite Communications (MILSATCOM) to assure critical information data flow to our deployed forces anywhere in the world. As DoD executive agent for all satellite communications ground equipment, the Army continues in FY95 its program to modernize and sustain the current $3 billion ground system infrastructure for the Defense Satellite Communications System (DSCS). The FY95 R&D funds will continue work on the replacement satellite payload commanding equipment, initiate the high data rate universal modem development, and complete the limited development of training simulators for the Signal School at Fort Gordon, Georgia. As the Military-

Strategic/Tactical Relay (MILSTAR) comes on line, the DSCS future mission will be the information super highway between the Sustaining Base (CONUS) and the deployed warfighter at EAC.

The MILSTAR system remains one of our most critical command and control programs. The Air Force launched the MILSTAR I Development Flight Satellite #1 in February 1994 and continues to develop the MILSTAR II satellite that will be an essential element of the Army's assured communications connectivity to our deployed warfighters. The Army's MILSTAR terminal program has entered EMD. MILSTAR will provide a worldwide, secure, jam-resistant communications capability that is urgently needed to prosecute warfighting missions horizontally and vertically at corps and division levels. The Army's terminal program is in phase with the first launch of the MILSTAR II satellite, currently scheduled for FY99. The Army's power projection force will depend on space communications as the cornerstone of the C4I strategy for the warrior.

Dominate the Maneuver Battle. Decisive operations require controlling vital land areas and the destruction of the enemy's land combat capability. The Army must always maintain a substantially overmatching capability in maneuver forces, for here the battle is decisive and the risk to our soldiers is highest. Advanced weapon systems and technology will continue to proliferate around the world. To ensure swift, decisive victory with minimum casualties, the Army combined arms team must be able to out think, outmaneuver and outshoot potential adversaries day or night, in any weather.

To achieve maneuver battle dominance in the near to mid-term, the Army is pursuing a technology insertion approach to modernization by integrating digital and advanced infrared sensors into Abrams tanks and Bradley Fighting Vehicles and modifying the AH-64 Apache helicopter to the Longbow configuration with a leap-ahead day/night/adverse weather target acquisition radar, fire and forget HELLFIRE missiles, and advanced digital processors and communications. These upgrades are all compatible and will allow these systems to exchange friendly and enemy position data directly from video display to video display. In addition, all can link with scout helicopters and artillery fire direction centers, and transmit data directly to C2V and to ATCCS components. This powerful linkage of combat systems allows the commander to provide a common view of the battle to all elements, speeds-up the tempo of maneuver, and reduces the potential for fratricide. It allows us to dominate the maneuver battle by dominating the information battle.

We will begin upgrading older M1 tanks to the M1A2 configuration this year, and the first pilot upgrade has already been completed. We initiated Bradley A3 and C2V systems upgrade development, and we are working to bring these systems on line more quickly. Longbow Apache is in flight test with all six prototypes and will enter Force Development Test and Evaluation (FDTE) this fall. It will complete development with an IOTE in early FY96 and enter production. FUE for M1A2 is FY96 and Longbow Apache FUE is FY97. Once fielded, Longbow Apache's all weather target acquisition system will provide first-ever long-range detection and automated classification, prioritization, and target hand-over for the modernized Apache team and the other combat and command and control systems linked to it. For the first time ever, a coordinated, rapid fire, precision strike capability will be available to the maneuver force commander on a 24-hour basis in day/night/adverse weather conditions. By the early 21st century, Comanches equipped with the Longbow radar and HELLFIRE missiles will perform this mission for our light and special purpose forces. Longbow HELLFIRE will complete development during FY95 as well and facilitize for initial production. Putting the digital capabilities of all these systems on the battlefield at the same time leads to the optimization of all four. The sooner we can field Longbow Apache, Bradley A3, and C2V to units already equipped with the M1A2, the better. This will be an awesome combined arms team -- one clearly good enough to take on any anticipated threat until beyond 2010.

The Breacher program continues in DEM/VAL with prototype testing to begin in FY95. The Breacher is based on the M1 Abrams chassis and is equipped with a full-width mine clearing blade and a power-driven excavating arm to support maneuver force mobility through minefields, rubble, tank ditches, wire, and other obstructions. The Army currently has no system with these capabilities and the program was initiated as a result of lessons learned during Operation Desert Storm. Its importance cannot be overstated because the M-1 Breacher system provides the combined arms team with an integrated, counter-mine and counter-obstacle capability in a single, survivable vehicle.

Conduct Precision Strikes. To conduct synchronized, decisive operations, the Army must strike and destroy enemy forces throughout the battlefield -- in close in support of the maneuver battle, laterally to our flanks, and deep in advance of friendly lines. To accomplish this, the Army must have modern artillery, attack helicopters, missile systems with adequate range and firepower, and effective munitions. The munitions suite must include munitions that defeat moving vehicles as well as munitions to destroy high priority, short dwell targets such as tactical missile launchers and enemy air defenses. Against moving enemy maneuver formations, the Army must concentrate and coordinate indirect fires along with massed helicopter attacks.

The Advanced Field Artillery System (AFAS) and the Future Armored Resupply Vehicle (FARV) continue in concept development. They are the Army's top priority, next generation ground combat vehicles, providing leap-ahead indirect fire cannon and artillery resupply systems for armored forces. AFAS/FARV will provide improved capabilities in range, rate-of-fire, time-on-target, accuracy, survivability, mobility, and ammunition handling speed with reduced manpower and logistics burdens. AFAS will use the world's first liquid propellant gun and is the "technology carrier" for other future armored systems -- employing robotics advanced fire control computing techniques, self-protection features, and signature control. An innovative request for proposal for a DEM/VAL phase that takes advantage of all approved acquisition reform initiatives has been drafted for release. Contract award is scheduled for FY95. FUE is scheduled for FY06.

Other initiatives in this area include continued development of the Improved Army Tactical Missile System (ATACMS), with improvements designed to increase the range and effectiveness for deep operations, and advanced submunitions such as the Brilliant Anti-Armor Submunition, or BAT, that will be delivered by ATACMS. In FY95, the Improved ATACMS will continue development of the Pre-Planned Product Improvement (P3I)/anti-personnel/anti-materiel (APAM) effort initiated in FY94 and will support completion in early FY95 of the P3I/APAM missile participation in the Joint Precision Strike Demonstration. FUE is scheduled for FY97.

Continuing in EMD, BAT is a self-guided submunition that uses both acoustic and infrared sensors to locate and attack moving armored combat vehicles without human interaction. BAT submunitions are carried deep into enemy territory by a variant of ATACMS and then dispensed over areas of high-payoff targets to autonomously detect, attack, and destroy individual targets. As a result of the decision to terminate the Army's participation in the Tri-Service Standoff Attack Missile (TSSAM) program, the BAT program is currently realigning with ATACMS Block II as the carrier. The FUE date for a BAT on ATACMS will be FY01. This is a lower risk approach than continuing TSSAM.

Entering EMD in FY95, the ATACMS Block II (BAT carrier) will be a ground launched solid propellant inertially guided missile system with 13 BATs as its payload. The mission of the ATACMS Block II is to delay, disrupt, neutralize, or destroy armored combat vehicles and other postulated high-payoff targets. The ATACMS Block II will be launched from the standard M270 Multiple Launch Rocket System (MLRS) launcher. In FY95, we will initiate EMD, conduct static and sled tests, and begin integration activities with the BAT submunition.

The Extended Range Multiple Launch Rocket System (ER-MLRS) continues in development. MLRS performed spectacularly during Operation Desert Storm, but commanders concluded that the system would be even more effective if the range could be increased from the current 32 kilometers up to 50 kilometers. The development program includes the addition of a low-level wind measuring device on the M270 launcher to enhance accuracy and effectiveness, and incorporation of a self-destruct fuze on the submunitions to increase safety for friendly maneuver forces. The program is on schedule with no technical difficulties. In FY95, we will continue development, including ballistic flight testing and self-destruct fuze development and fuze qualification. FUE is scheduled for FY99.

The Joint STARS Ground Station Module (GSM) is funded in FY95 to conduct Block I modifications (improved commonality/standardization for light, medium, and heavy GSMs) in preparation for production. The Joint STARS aircraft and radar systems are managed by the Air Force. Joint STARS collects near real-time radar imagery deep into the enemy rear for targeting and intelligence dissemination. With a GSM at maneuver and fire support Headquarters, Joint STARS reduces the sensor to shooter timelines increasing the speed with which rapidly moving, high payoff targets can be attacked.

The RAH-66 Comanche, as previously discussed, also has great utility in the precision strike role. It's long-range, high speed, reduced signatures and precision HELLFIRE missiles make it highly effective for long-range strikes, particularly when it can take advantage of night/adverse weather.

Protect the Force. Protecting our soldiers has always been important to us, but the lethality of modern weaponry and the availability of relatively long-range rockets, missiles, and cruise missiles to even unsophisticated threats causes us to reemphasize the protection of our forces. We need air defense, particularly defense against theater ballistic missiles, cruise missiles, and unmanned aerial vehicles (UAVs). Effective, long-range missile defense is required to protect critical bases, ports, maneuver forces, and political targets/population centers from weapons of mass destruction. Realizing there is no 100 percent effective defense, we must maintain the capability for our soldiers to operate protected in a chemical or biological warfare environment. Finally, combat identification through passive and nonpassive means is essential to reduce the potential of fratricide and protect our soldiers from friendly fires.

PATRIOT Advanced Capability-3 (PAC-3) is a total system performance improvement of the PATRIOT PAC-2 that performed so well during Operation Desert Storm. The PAC-3 upgrade includes improved ground equipment and a new missile designed to counter the evolving and more stressing TBM and air breathing threats with much greater lethality and range than PAC-2. There were two candidates for the PAC-3 missile: Multimode Missile and Extended Range Interceptor (ERINT). Last February, the Army Systems Acquisition Review Council (ASARC) selected the ERINT as the PAC-3 missile, primarily because of its lethality against existing and near-term theater ballistic missiles with warheads of mass destruction. ERINT is a hit-to-kill missile that destroys incoming theater ballistic missiles and air breathing targets through body to body impact. The program is funded jointly by the Army and the Ballistic Missile Defense Organization (BMDO). PAC-3 will begin EMD in FY94 and continue design and component development in FY95. Low-rate initial production will start in FY97 and FUE is planned for FY98.

The Theater High Altitude Area Defense (THAAD) system is being designed to negate theater ballistic missiles at high altitude and long ranges to expand battlespace and defeat missile threats directed against military forces, critical and strategic assets such as population centers and industrial resources. THAAD is deployed at EAC and will free the lower tier (i.e., PATRIOT PAC-3 and/or Corps Surface-to-Air Missile (Corps SAM)) to concentrate on air breathing threats and to protect high value assets against missiles that leak through the upper tier. Plans in FY95 include completion of the missile flight test program and the initiation of THAAD system tests with the Theater Missile Defense-Ground Based Radar (TMD-GBR). TMD-GBR is the primary sensor for THAAD. It provides wide-area surveillance and fire control support to the THAAD system and also cueing support to lower tier systems. TMD-GBR uses state-of-the-art radar technology to accomplish its required functions of threat attack early warning, threat type classification, interceptor fire control, external sensor cueing, and launch and impact point estimation. FUE for THAAD with TMD-GBR is FY01, although an early operational capability will be available in FY97. THAAD and TMD-GBR are funded by BMDO and managed by the Army.

In FY95, concept development contracts for Corps SAM will be awarded. Corps SAM, the critical lower tier component to provide low-to-medium altitude air defense/TMD, fills a critical need for both the Army and the Marine Corps that is not satisfied by any other current or planned system. It is designed to be effective against short-range rockets, theater ballistic missiles, cruise missiles, and UAVs, and have the maneuverability to keep up with and protect our Abrams and Bradley equipped maneuver force. EMD for Corps SAM will start in FY03 with FUE planned for FY08.

Equally important is our ability to detect rocket, missile, and cruise missile launchers and fire control systems and destroy them before they can be used. The Joint STARS with its GSM, Improved ATACMS, and Longbow Apache provide our near-term capability to detect and destroy these targets. Longer-term, Comanche, AFAS, and BAT will add to this capability.

In FY95, the Army will complete ground-to-ground EMD and developmental testing of the Battlefield Combat Identification System (BCIS). BCIS resulted from friendly fire casualties during Operation Desert Storm and will be developed, produced, and fielded to a heavy division of the contingency force by the end of 1997. BCIS is a cooperative question-and-answer device that will identify friendly ground vehicles by requiring attacking vehicles to transmit a coded signal toward the target prior to firing.

Friendly vehicles equipped with a transponder will respond with a coded reply indicating their friendly status. BCIS will be tested as a stand alone system and as an input to the situational awareness of heavy forces to determine its value added on the digital battlefield.

In order to ensure that our forces will fight successfully in a contaminated environment, the Army will continue in FY95 the Nuclear, Biological, and Chemical Reconnaissance System (NBCRS) engineering and testing efforts. The upgraded NBCRS will add the Remote Sensing Chemical Agent Alarm (RSCAAL), currently in production, and then integrate an advanced navigation system, jam resistant communications, and sensor/data processing systems. A new Aircrew Protective Mask is being developed which is compatible with aircraft sighting and navigation systems. Development continues on the Biological Integrated Detection System (BIDS) to provide detection, identification, warning, and sample collection for verification that a biological attack has occurred.

Project and Sustain the Force. Although we have a global mission, the Army is now largely CONUS-based. When called upon, we must project our power into trouble spots and our forces can expect to be the first troops on the ground in a crisis. The capability to deploy highly lethal combat forces and sustainment assets rapidly from power projection bases here at home and from our remaining forward presence locations abroad is fundamental to our success in any mission. We fully support the airlift and sealift programs of our sister services, while we work to preposition supplies and equipment, both ashore and afloat, in key areas throughout the world. We cannot preposition in every potential trouble spot; therefore, we are also increasing the combat capability of our earliest deploying light forces in order to get more lethal forces to areas of conflict more quickly.

The Javelin provides our soldiers a man-portable, highly lethal system against any known conventional or reactive armor threat. It features fire-and-forget technology with a maximum range of 2,000 meters in adverse weather, day or night, and weighs less than 50 pounds. It can accompany our airborne forces on parachute drops. The program completed development and begins low-rate initial production in May 1994. It met or exceeded expectations in the Army/Marine Corps Initial Operational Test and Evaluation (IOTE) completed in December 1993. Javelin hit on 49 of 54 live shots. The RDT&E request permits the completion of both the Enhanced Producibility Program, an effort to save more than $120 million in production costs, and the training device upgrade effort to improve the durability and reliability of the training devices.

Initial production of the Armored Gun System (AGS), the replacement for the M551A1 Sheridan, was planned for FY95, but was delayed. AGS will complete early user operational testing in FY95 and we expect to enter low-rate initial production in FY96. AGS is among our highest priorities because it will provide a rapidly transportable, air droppable, protected, direct fire system for the light forces. Consequently, it is important that we keep this program on track.

The Improved Target Acquisition System (ITAS) for the TOW (Tube-Launched, Optically-Tracked, Wire-Guided) missile continues in EMD. ITAS will improve the target detection, recognition, and engagement capability of the High Mobility Multipurpose Wheeled Vehicle (HMMWV) mounted and ground launched TOW missile by incorporating a second generation forward looking infrared (FLIR) capability, a laser range finder, and automatic tracking features. This program is the pathfinder for second generation FLIR systems and includes the foundation for the IBAS (Improved Bradley Acquisition System). The high degree of commonality among second generation FLIR systems provides a strong production base and reduced logistics costs. Although discussed in more detail in other areas, Comanche will be a significant contributor to the project and sustain capability. Its ability to self-deploy around the world, its reduced logistics burden, and its sensors and firepower make it an ideal force projection system.

TECHNOLOGY DEMONSTRATIONS/LEVERAGING S&T

We have focused the Army's S&T activities on providing technical opportunities that are responsive to post-Cold War era needs and to the Joint Chiefs of Staff top priority future warfighting capabilities. To do this, we established a number of Technology Demonstrations to integrate promising technologies into unique systems, or important components of systems, and demonstrate the maturity of the technology and warfighting promise. Development risk is reduced resulting in better, more timely requirements. We work in close harmony with the user and his Battle Laboratories to explore these new technologies, different mixes of systems and components, as well as new doctrine and tactics. Every Army technology demonstration must involve at least one experiment at an Army Training and Doctrine Command (TRADOC) Battle Laboratory. Let me offer you a few examples.

The Army Precision Strike Demonstration objective is to develop and demonstrate a system-of-systems concept that integrates surveillance, target acquisition, C4, precision weapons delivery by ATACMS and Apache and combat assessment functions for rapid execution of strikes against high value, time-critical targets in minutes, even in adverse weather, day or night, or at extended ranges. Current Army precision strike capabilities will be enhanced by leveraging advanced technologies, new concepts and architectures through an evolutionary series of demonstrations which include live firings and simulations. One emerging technology examined by this program and the Unmanned Aerial Vehicle (UAV) Joint Project Office was the use of a UAV that operates beyond line-of-sight (LOS). The FY93 Beyond LOS UAV Demonstration was the first to demonstrate command and control of a UAV and its sensor payload via satellite link, while simultaneously relaying video imagery back via satellite link.

This year we will demonstrate advanced target acquisition capabilities and automated deep operations coordination in conjunction with the employment of Army deep fire systems against high priority targets. The use of a long-range, surface-to-surface Improved ATACMS capable of destroying soft targets, under adverse weather conditions, in a precision strike scenario will be demonstrated.

In FY95, the Army Precision Strike Demo, teamed with the Depth and Simultaneous Attack Battle Lab and U.S. Forces Korea, will construct and rehearse a demonstration to be conducted live in Korea in FY96, against a simulated, high value, time-critical threat representative of the real-world. The FY96 Korean Demonstration will focus on counterfire capability against enemy long-range rocket artillery operating from heavily fortified and protected positions in mountainous terrain. Emerging technologies will be integrated with advanced concepts and doctrine to ensure timely and responsive target acquisition and streamlined command and control to destroy enemy multiple rocket launchers swiftly to protect our troops in South Korea.

The Rapid Force Projection Initiative (RFPI) was created to demonstrate advanced technologies, concepts, and tactics for early deploying light forces with capabilities to defeat heavier forces. RFPI employs a "Hunter/Stand-off Killer" approach which relies on forward deployed sensors connected to precision, indirect fire weapons to attack an enemy armored force beyond direct fire range. For example, acoustic sensors can detect vehicles at several kilometers. Advanced sensors, such as these, can provide advance warning to attack and help direct fires against the enemy before he gets in range to attack our forces with his armor. Several stand-off killers will be evaluated, including 155mm smart artillery rounds, guided mortar rounds, and smart mines. One other candidate is the Enhanced Fiber Optic Guided Missile (EFOG-M), which offers the advantages of long-range lethality through top attack, resistance to countermeasures, and built-in combat identification because of man-in-the-loop operation. Simulations performed by TRADOC and government contractors have shown high potential for this approach.

The Advanced Vehicle Technologies Demonstration Program has a goal of demonstrating ways to make our combat vehicles smaller and lighter, so we can improve our ability to project power. Deployment of our heavy forces during Operation Desert Shield was difficult and time consuming; a future foe may not give us as much time to reinforce. In S&T, we are looking at a number of ways to improve deployability by lightening armored vehicles through use of composite materials for vehicle structures, innovative survivability techniques to reduce the reliance on heavy ballistic armor, and ways to reduce the number of crew members needed to effectively operate combat vehicles.

American soldiers are the finest in the world. We want our future soldiers to retain their technology advantage. The 21st Century Land Warrior program will demonstrate advanced technology and concepts for dismounted soldiers, while highly leveraging the commercial electronics and computer revolution. A key feature to be demonstrated in this program is the capability to accomplish mission planning and rehearsals in a virtual environment. Uncooled, lightweight night vision devices are an obvious winner. Advanced, lightweight body armor will improve soldier survivability. A position/navigation capability and soldier computer system could assist in coordinating operations. Our focus here is two fold: (1) to provide improved situational awareness, and (2) to provide near real-time automated targeting. Lightweight sensors and personal warrior communications linked to the force structure through a data network are key enabling technologies.

A major hallmark of the Army Technology Demonstration Program is its tie to our soldiers through active involvement with six Army Battle Labs and the Louisiana Maneuvers exercises. These are very effective tools to focus our efforts and reduce some of the risks we face in modernization. We must get it right before spending our reduced development dollars. Battle Labs link the industry, academia, and government S&T communities with the combat developers to experiment and analyze advanced technology, concepts, and tactics. Battle Labs and the Chief of Staffs' Louisiana Maneuvers exploit simulation and modeling to test concepts, refine requirements early, design more efficient field tests, and help provide early trade-offs between performance and costs.

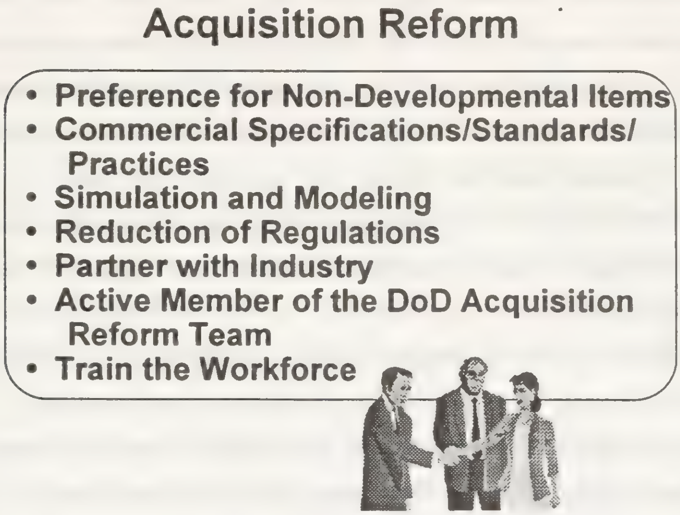
We are also exploring programs for Horizontal Technology Integration (HTI), the simultaneous integration of complementary technology across families of systems that fight and operate together on the battlefield. We will develop new prototype technologies, examine their benefits through our Battle Lab programs, and select the right technologies to place on existing platforms. HTI will increase the capabilities of the force rather than simply increase the capability of an individual system, and it is particularly suited to modernization during this era of austerity when we have many more upgrades to fielded systems than new starts. The second generation FLIR to be used on Abrams, Bradley, TOW vehicles, and eventually helicopters is a successful HTI program.leaving the S&T area to begin EMD.

Our modernization focus is on capabilities. Our approach to modernization in the near-term is to maintain a robust S&T program, and then assess the maturity and promise of new technology through Technology Demonstrations, Battle Labs, and Louisiana Maneuvers before inserting that technology into our weapons systems and support equipment.

ACQUISITION REFORM

Thanks to the ability and dedication of thousands of acquisition professionals in DoD and the defense industry, we have been able to acquire the best weapons and support systems in the world. But acquisition programs take too long and the cost of inefficiencies in the acquisition system is a price we can no longer afford to pay. We have reexamined the way we do business and are changing to a leaner, more flexible system based on commercial specifications and standards.

The emphasis by senior Army leadership on the need for dramatic change in the way we do business is critical to the change process. We have briefed and trained more than 2,200 Army and industry acquisition personnel during Road Shows I, II, and III. Forming cross-functional teams, eliminating low value added tasks and paperwork, creating performance based requirements, and using best value contracting are but a few of the fundamental changes being taught. We emphasize concurrent engineering, early integration of test and evaluation, extensive simulation early, obtaining commercial products where possible, using commercial specifications and standards, and eliminating paperwork and reports.



Acquisition Reform

- Preference for Non-Developmental Items
- Commercial Specifications/Standards/ Practices
- Simulation and Modeling
- Reduction of Regulations
- Partner with Industry
- Active Member of the DoD Acquisition Reform Team
- Train the Workforce

The Army has adopted this innovative approach to acquisition. We are reducing and/or eliminating barriers between the Army and our industry partners by reducing military specification requirements and eliminating the need for reports by using linked computer data bases. For example, the Army is in the process of requesting proposals from industry for the AFAS/FARV Demonstration/Validation. The Army will encourage prospective contractors for AFAS/FARV to use nondevelopment items at the subsystem and component level to the maximum extent practical to meet defined system performance requirements. Only the main gun system, which uses liquid propellant, will be specified. This provides prospective contractors with design flexibility similar to development of commercial products.

We seek to lower the cost and reduce the time to acquire AFAS/FARV by reducing or eliminating non-value added requirements, conducting effective concurrent engineering through Integrated Product Development Teams, exploiting the use of rapid and virtual prototyping in engineering design, and streamlining operational testing through the aggressive use of Distributed Interactive Simulation. In short, we will develop and field the finest artillery system in the world and we seek an industry partner who shares our goal. We encourage potential partners to share with us not only their knowledge and skills of design, fabrication, and production of hardware and software, but also their expertise of program management. We want their help in framing the best technical approach, along with a plan to execute the program. We want innovation, lower costs, and earlier fielding. We want the most cost-effective, best value howitzer system the Army can buy.

Likewise, the Comanche program is capitalizing on DoD initiatives to streamline the acquisition process, remove duplication of efforts, take maximum advantage of commercial practices and remove any specifications, standards, policies, or regulations that do not add value. The recently streamlined program will retain all Comanche capabilities while maintaining schedule for Initial Operational Capability. Program details are still being worked, but Comanche streamlining entails a single phase development program, applies commercial approaches were practical, and uses simulation to the maximum. Our goal is not only to retain full capabilities, but to achieve several hundred million dollars of cost savings and avoidances.

One of the primary reasons for our tremendous success with the Comanche program is Team Comanche, headed by a joint government/industry oversight group comprised of the prime contractor CEOs and senior Army leadership. This group meets quarterly to address and resolve issues and to determine the appropriate course of action for the coming quarter. The team concept extends downward through the working levels where it functions in the form of Product Development Teams. This is the right way to manage complex programs and "teaming" has become Army acquisition's primary management structure.

CONCLUSION

We have the solemn responsibility of ensuring that our men and women are well-equipped and have the decisive advantage they need to deter or win decisively in future conflicts. It is a formidable challenge in these days of shifting and nebulous threats and reduced resources.

The key to success is our commitment to continuous modernization and effective acquisition reform. Our program is delicately balanced and cannot be accomplished without reducing overhead, eliminating no-value-added/low-value-added elements and investing the savings back into features the user must have.

Our military success has taken us in a new direction and success has provided us with new challenges as well as opportunities. We are making tough choices and smart choices. We are on course. With your support, we will continue to provide our soldiers with world-class equipment.

Thank you.

HIGH MOBILITY MULTIPURPOSE WHEELED VEHICLE (HMMWV) SEATS

Mr. MURTHA. General, four years ago I was out visiting the field and I noticed an uncomfortable seat in the HMMWV that the troops were using. A year later, they told me they had solved the problem.

I was visiting Fort Campbell recently and I opened the door on the HMMWV and saw the most convoluted seat I had ever seen. It had a pad and another pad on top of it. I don't see how you could sit on that comfortably. What progress are we making in putting a seat in the HMMWV's?

General FORSTER. That was BM—before Murtha.

We now have the Murtha seat, which is the contoured seat that you have an example of. In fact, I brought a picture of it right out of the parts manual because this is what I would order as a replacement seat for an older HMMWV.

Mr. MURTHA. How many are out in the field?

General FORESTER. We have five or six thousand HMMWV's off the production line with these seats and we have sixteen thousand of the seats in the supply system.

That is what you would get as a replacement seat as the old ones wear out.

Eventually they will all have the contoured seats.

Mr. MURTHA. In five years, most will have a replacement seat?

General FORESTER. Sir, if they don't find out how comfortable the seat is and we start getting unexpected puncture wounds in them, I would expect it would take five or six years to wash them out. It might be sooner, Mr. Chairman.

Mr. MURTHA. Mr. Dicks.

Mr. DICKS. Thank you. Do they like the seat better than the old seat?

General FORESTER. Yes, sir. It was a cushion on a bed of nails.

COMANCHE PROGRAM

Mr. DICKS. What is the status of the Comanche program?

General FORESTER. That is doing very well. As you are well aware, it has been restructured four or five times with the help of a lot of external agencies, but we now have it stabilized into a full Demonstration Validation (DEM VAL) program leading into engineering development and then into production in the late nineties.

It remains the Army's number one R&D program. It is within three percent of its expected performance both within cost and on schedule.

They are about a month ahead on completing the first prototype. We have seen it. It is laid up on a Keel beam, moved from Station 1 to Station 2. It should roll out next January with the first flight in late summer.

The second prototype is in the build-up frame there, a unique way to build airplanes, not seen before. We have gone through and taken a look at the stuff that has crept into that contract as it has gone from one restructure to another and have made a conscious effort to eliminate a lot of unnecessary work and a lot of what I would consider unnecessary cost associated with the development of that program.

We have had good success in doing that with the help of the contractors there. We think we can avoid about $300 million in cost at least in R&D programs and that is all we were looking at.

But in doing that, we found a way to reduce the cost of the article by $200,000 a copy by going to a better civilian electronic component than the MILSPEC component.

Mr. MURTHA. When I was there, you talked about the number of parts in the Comanche versus the number of parts in the Apache. Would you go over that?

General FORESTER. I would say that on a comparison basis, it is probably better to compare Black Hawk with Comanche because Black Hawk was built at the same facility by Sikorsky. There were thousands of basic parts in the fuselage of a Black Hawk not counting rivets and fasteners, about a thousand different pieces that were formed and shaped and riveted together to make the Black Hawk fuselage.

There are probably less than 50 of the equivalent size and equivalent type parts in a Comanche fuselage.

Mr. MURTHA. Much safer?

General FORSTER. Much safer.

It is built on what they call a Keel beam technique, somewhat like a ship in the sense that you have the major load-bearing structure coming through the middle and you box around that and then you get the shaping for the low observable capabilities that is a nonload-bearing surface on the outside.

Another advantage which has arisen is because the outside shaping is not load-bearing, you can have many access panels so it makes the mechanic's job easier to replace parts because you don't have to worry about having a small hole this big because you couldn't stand two G's.

That program is going well. The Chief is going up to Boeing, and the other partner with Sikorsky on Friday, and we will see how they are coming along with the mission equipment package and the systems development for the aircraft itself.

ARMED RECONNAISSANCE HELICOPTER

Mr. DICKS. Tell us again what is an armed reconnaissance helicopter?

General FORSTER. Sir, that is a helicopter primarily designed to do reconnaissance, which is to go find the enemy, maintain contact with the enemy, keep his location known at all times, and report that back to the commander so he can take advantage of the situation so we know where he is, but we try to avoid him finding out where we are.

One of the first precepts in a recon helicopter is not to get engaged with the enemy and not give away the fact that he is being observed. That is where stealthiness plays in helping him get within range and not be detected.

There will come a time when you have to engage the enemy. He is moving too fast. You need to slow him down. You have a target of opportunity that you cannot pass up or you need to engage him so you can see what is there. That is why you need armament on it.

In some cases, which are normal cavalry missions, you are put out in a screening effort on a flank where a commander doesn't want to put a lot of forces so he puts something with good sensors, fairly high-fire power and mobility.

In that case, you have to be able to take an enemy under fire and stop him if he tries to penetrate around the flank; find the enemy, fix him in position, determine his intentions, develop the situation and report all of that back to the commander, and you arm it so it can take advantage of what it sees, but it is not intended to engage in combat.

It replaces OH–6s, the early OH–58As and C's and the AH–1 Cobra.

Now because we don't have enough good armed reconnaissance helicopters in most of our cavalry units, you will find a mix of OH–58C's and Cobras. The OH–58Cs aren't powerful enough to carry armament or a good sensor so they have to have the AH–1 armed helicopters to fly cover for them.

The Comanche will do both missions.

MODERNIZATION

Mr. DICKS. You show modernization and you say win the battlefield, information war, dominate maneuver battle, precision strike, project and sustain.

In each case, you have Comanche listed as number one in terms of its capability.

General FORSTER. That doesn't mean it is the best in everything, but it is the only system we have that operates in all five capability areas, which is why Comanche remains the Army's number one R&D program.

It does come armed with air-to-air Stingers so it can do force protection against attack helicopters and low-flying attack fixed-wing aircraft.

Because of its reduced signature, its range and its capability of getting behind enemy lines, it can take out surface-to-surface missile launchers if that is required, and in that sense protect the force as well as conduct a precision strike with Hellfires and Longbow Hellfires on board.

If you don't have reconnaissance, you are not going to dominate the maneuver battle. It will have the capability to transmit data from its sensors back through the digital network to tanks, to Bradleys or the follow-on fighting vehicle, to Apache Longbows and to the Command and Control Center.

So it is primarily there to win the information war. So winning the information war is first capability, but it plays in all the other four as well.

Longbow plays in two or three. The advanced field artillery system plays in two or three, but Comanche is the only one that plays in all five.

It projects because it is self-deployable. It doesn't take airlift to get to the battle. It can self-deploy anywhere around the world.

Mr. DICKS. How is your funding going?

General FORSTER. Fine.

The combination of the streamlining efforts we have made plus the funding that we have set aside for it in our long-range plan, Comanche is a fully funded program.

Mr. DICKS. Thank you, General.

Thank you, Mr. Chairman.

Mr. MURTHA. Mr. Skeen?

HELSTF PROGRAM

Mr. SKEEN. Thank you, Mr. Chairman.

General, we have asked for a report twice on the long-term plans for the HELSTF. Now, January was one deadline, now March.

Is there a report in progress?

General FORSTER. There is. The Army has completed its part of that and submitted it to the Office of the Secretary of Defense to the Director of Defense, Research, and Engineering, and they have elected to incorporate it into an overall plan on high-powered lasers.

That is not complete yet and they have come back to this committee and to all committees and asked for an extension through June.

So you will see our report on HELSTF as part of an overall OSD report on where we are going with high-powered lasers.

Mr. SKEEN. Does the Army still have a place for the high-energy laser systems?

General FORSTER. We do not.

Mr. SKEEN. I am not asking you to preempt your report.

General FORSTER. We do not, and the reason is that it is not an investment that we can afford to make at this time. It will take too long and too much money to bring it to a weaponization status.

Mr. SKEEN. Has there been an attempt to find another sponsor for it?

General FORSTER. Yes, sir. We have gone around and that is the most disappointing part of it to me, that we could only find $800,000 worth that we could farm out toward the end of this year and next year.

That just is not enough to pay the $20 million or so to support the appropriation.

HAWK MISSILE

Mr. SKEEN. On the Hawk missile, I know that you have dispersed some of these Hawks to Guard units.

Your budget doesn't support the implementation of the Hawk program. You have dispersed them, but there is nothing to operate them with.

General FORSTER. That is right. We need to try to make a conscious decision along with the National Guard to either support the unit, the 200th, which is the second hawk battalion in the New Mexico National Guard, or make sure that there is no requirement for it.

If there is a requirement for it, we need to find the money and support it. We have great affinity with the New Mexico National Guard and they have covered for us on many occasions so we are interested in fixing that problem.

Mr. SKEEN. I appreciate your comments. This have been problematic ever since we have taken on those systems.

Are you in the process of deciding whether or not there is a place for this type of weapon?

General FORSTER. Yes, sir. First of all, if there is a requirement for the unit, we have to fund it.

As the Army downsizes, maybe there are battalions out there that we don't need and we need to make sure we address that issue first. That is going on first in conjunction with the Guard. If it sticks, we will make sure it stays operational in training.

Mr. SKEEN. We are right at the point of being obsolete as far as the use of the Hawk missile. Is that part of the problem?

General FORSTER. Yes. The Hawk is getting old. I started off in the Army in the Hawk. That is how old it is.

Mr. SKEEN. You are a pretty young man.

General FORSTER. I don't feel so young. But it is getting old. It is getting harder to maintain. It is one of those systems that we can't afford to put a lot of money in to upgrade. It is an older system that has no capability against TBM's and cruise missile-type threats that we see on the horizon. So it all plays together.

Mr. SKEEN. I assume that if you have an updated missile, you will probably disperse that or assign it to other Guard units?

General FORSTER. Yes, sir. Unfortunately, the replacement for Hawk is going to be a long time coming.

Mr. SKEEN. That will all be in your report?

General FORSTER. Yes, sir.

Mr. SKEEN. Thank you very much.

Thank you, Mr. Chairman.

[The information follows:]

Over the past three years, we have inactivated the last eight active Army Hawk battalions from the Army's structure as we draw down and reshape the force to counter the post-Cold War threat. At the end of fiscal year (FY) 1994, only four Hawk battalions will remain in the Army inventory, all in the Army National Guard. A fifth battalion (2–200 Air Defense Artillery in New Mexico) was originally programmed for activation in FY 1995, however, the funding required for this activation was removed prior to the FY 1994 and FY 1995 Presidential Budget Submissions. On April 18, 1994 the Army formally deleted the requirement for a fifth HAWK battalion. Our current force structure now reflects a requirement for one Hawk battalion per Corps Air Defense Artillery Brigade.

The HAWK system has been in the Army inventory since the late 1950's and proved itself to be a significant deterrent in United States Army Europe, at the height of the Cold War, however, emerging threat technology is rapidly outpacing the capabilities inherent in our existing HAWK systems. We have made the decision that our money would be better spent on a new system (CORPS Surface to Air Missile) that will completely counter the emerging low to medium altitude air threat to our maneuver forces, rather than on costly upgrades to a 35 year old system that is very expensive to operate and maintain.

It is our intention to keep four Hawk battalions in the Army National Guard, in their current configuration, as long as the cost of operations and maintenance does not become prohibitive.

COMANCHE FUNDING

Mr. MURTHA. There are a couple of things that Mr. Dicks asked about which concern me. He asked whether you have any funding problems.

We were visiting a plant where we were told that it costs about $44 billion for 1200-some-odd Comanches. Staff understands that you are underfunded, and because of the funding shortfall, you are streamlining the acquisition and jumping from the prototype program immediately into low-rate production. Is that accurate?

General FORSTER. No, sir, not accurate at all.

We would have streamlined that program, whether it had a funding problem or not. That program started off on the old system where you had a DEM VAL, which didn't require prototypes flying and you went into an EMD, and get the capability there, and then you went into low-rate production.

Somewhere the rules got changed and they went into a different concept. We stuck with the basic contract out of context.

OSD said, "No. Stop it after DEM VAL, but do a fly before you buy the program. That shoved us into doing early prototype work different from the EMD prototypes so the whole program needed to be rationalized.

We did have a $240 million or so shortfall in the development program and I was confident that if we streamlined the program we could take care of that shortfall.

I hoped we could speed the program up by taking advantage of some of the OSD streamlining initiatives. We have taken care of the shortfall. We have work to do on just how much we can pull the IOC forward.

Mr. MURTHA. As I understand, this is the second biggest program you have been involved in. The M1 tank was bigger. Not going through all the procedures, you may save money in the short term, but it may cost us money in the long term.

Is this streamlining a result of trying to save money or from an OSD directive that changes the procedures?

General FORSTER. Well, it comes from the Secretary's overall philosophy that we pay a premium for doing business the way Defense has been doing business and we need to become more businesslike in our approach.

I agree with that, but he didn't direct it. It was the Army's initiative to do this because we have put a different cover sheet on the same contract two or three times and we had opportunities in there where we were paying for things we no longer needed.

STREAMLINING COMANCHE DEVELOPMENT

Mr. MURTHA. I appreciate that, but here is my concern: With a program this large and important as it is, you are not taking shortcuts in your opinion that may cause us a problem down the road? You are confident that the approach you are taking is the right approach, not just the most cost-effective approach—you are reducing costs, but not in any way jeopardizing the program? Is that what you are saying?

General FORSTER. We are confident that we are reducing costs, but we are not jeopardizing the program or adding risk.

In fact, there are a couple of cases where I would say we have reduced the risk by streamlining. A case in point: We found out that one of our requirements was to use ceramic encapsulated, electronic components, or CEEMS in the production aircraft.

DOD is the only buyer of CEEMS right now. Now six years from now when we put Comanche in production, can you imagine what it is going to cost if we are the only ones still requiring that type of technology whereas the civilian world has passed us by?

They have a plastic encapsulated one that does better at a third of the cost. We made a conscious decision not to integrate the Longbow on the Comanche on the first production line, but delay that for three years so that Longbow production picks up as it tails off for Apache. That puts the burden of risk for Longbow on Apache.

It also lets Comanche now take advantage of lessons learned whereas before, you were stuck. Whatever Apache had is what you got. Now they can do downsizing and better match the Longbow to the Comanche. So I think in a sense we have reduced some of the risk in the program.

Mr. MURTHA. The staff has information that indicates that you have gone to a consultant to develop a plan for what I am characterizing as streamlining. You may be characterizing it a little differently, and you don't have a plan yet. Is that accurate?

General FORSTER. We have the basics of a plan already. We have briefed it once to OSD, got conceptual approval and were told to work out the details. We will come back the first week in May to get formal approval on the plan from the Deputy Defense Acquisition.

Mr. DICKS. Did you hire a consultant or not? That was the question.

General FORSTER. Not at my level. The Program Office has a number of support contractors that they may have gone to to work the details on this.

Mr. MURTHA. I have a publication entitled Inside the Army, dated March 28, 1994. Highlighted for me is—Comanche team to tap Maryland-based consultants for streamlining help——.

General FORSTER. Sikorsky and Boeing may have done that. I don't know.

Mr. MURTHA. This started out by Mr. Dicks being concerned that you don't have the appropriate funding, and I became concerned that we weren't asking the right questions. If the decision is that this is your priority for the Army, we just want to make sure that the funding is there to do it the right way.

General FORSTER. Sir, our intent is not to in any way increase the risk of the program by streamlining it. We think we will reduce the risk by putting money on productive stuff as opposed to on paper.

If we have overstreamlined it in our opinion or in OSD's opinion, then we will have to make sure that we fund the right program.

I think it is wrong for us to put money in a program like this at the expense of other programs when, in fact, we can find a better way to do business.

STREAMLING IN OTHER PROGRAMS

Mr. MURTHA. The Air Force indicates a problem with the C–17 and that has been a major problem. The witnesses stood here and said it is nothing but a software problem, and year after year, it was nothing but a software problem.

Concurrency is what they say now is a big part of the problem. You are using concurrency in order to streamline and it makes it more risky, it seems, from our experience in the past.

General FORSTER. I guess I would tell you that I don't see anything wrong with concurrency that is done in a commonsense way and is managed properly.

Mr. MURTHA. General Forster, you are talking about the biggest program the Army has, and it is the second largest program in the history of the Army. It seems to me we are taking a chance on concurrency when our experience with other big programs—the B–2 and the C–17—is that we have a problem.

General FORSTER. Sir, the only concurrency that I can think of that has come into the Comanche streamlining program is that we have elected to do the military qualification and the preliminary flight-rating testing on the T–800 growth engine at the same time and that is not a risk.

Eighty percent of the data for the two qualifications is exactly the same and it says that we are going to work with our contractors and share that data. The Army is going to get part of it to look at and the FAA will get part of it.

That is not a risk program. That is taking something where you used to duplicate data between contractor and government and sharing the data as it should be done.

Mr. MURTHA. GAO reported on the problems concurrency caused on the Apache attack helicopter. As I understand it, streamlining will reduce the number of test helicopters by a third.

General FORSTER. We will take out at least one prototype on the Comanche and maybe two. We are not sure yet.

The reason we can do that is because we are about two generations ahead as far as simulation and man-machine interfaces and interactive simulation, virtual reality than we were under Apache.

I think that this is not a high-risk item to do that, to do more upfront work on a simulator, particularly to get the cockpit interfaces and arrangements and man-machine done by simulation as opposed to dedicating an expensive prototype to do that.

Mr. MURTHA. I would hope you would go back and talk this over and voice my concern—the Committee's concern—about the proce—dures because if you are driven by cost, we have a real concern.

If you are driven by legitimate cost savings, which are cost effectiveness or efficiency, then it is a different story. But I would hope that this program a year from now is not going to be in trouble because of something that has been done in the interim.

Mr. Dicks.

Mr. DICKS. Thank you.

I know we went through the B–1. We have gone through the C–17. We have gone through the B–2, and we didn't build prototypes. Now, are you building prototypes in this?

COMANCHE PROTOTYPES

General FORSTER. Absolutely, sir. We are building at least four and we will have a ground-test vehicle in addition to that that we can turn into a flyable prototype.

Mr. DICKS. How much testing will you do on those prototypes before you go into production?

General FORSTER. Several thousands of flight test hours. It will be extensively tested. About 60 months of flight test are involved.

Mr. DICKS. The Air Force came in and said they have religion, that they made their mistakes, and they were not going to make those same mistakes on the F–22, and they are going through a very long program.

I think it is dangerous. I understand you have to have a certain amount of momentum with these programs. If they go on forever, they become more vulnerable.

They are saying they are going to take as much concurrency out of the program as possible. That doesn't sound like what you are doing.

Having lived through other nightmares, I don't want to see this one turn into that kind of a problem.

General FORSTER. We used the Boeing parts of the team to see how they have developed airliners. They have an excellent track record or long-time deliveries at relatively low cost.

I am not prepared to take the risk that the Boeing commercial airplane company might take on some of their stuff because they are pretty racy in what they do, but it is less complicated from a technology standpoint as well.

We have learned from them a couple of things to do to save some time. We are not trying to inject risk here. We have not moved up the IOC by streamlining because to do that in any kind of a safe way would mean you would have to add more dollars upfront and we can't afford that.

We have eliminated non-productive work, but kept the IOC the same.

Mr. MURTHA. You are saying that the reason you are doing this is because you can't afford to add money upfront?

General FORSTER. No. I am saying that you cannot advance the initial operating capabilities of Comanche through streamlining without incurring too much risk unless I pay more dollars upfront.

In other words, streamlining will not help me get the aircraft sooner as far as I can see it now. We are trying to keep the costs down, but we are trying to keep the risk down. I can move the IOC up, but I would have to cut out testing and incur more risk. I am not prepared to do that.

Mr. DICKS. What is the IOC date?

General FORSTER. 2003.

Mr. MURTHA. Mr. Wilson.

EXTENDED RANGE INTERCEPTOR TECHNOLOGY (ERINT)

Mr. WILSON. Thank you. Mr. Chairman, I am going to take as much time as you will allow me and then I will be here for the second round.

General Forster, first I want to tell you that sitting on either side of you, you have two total sadists who spent about two weeks throwing me into the depths of depression and despair, convincing me beyond all reasonable doubt that the multimode system was going to be selected over ERINT. I still don't know why they did that, but they were very successful.

I want to talk about the intense lobbying effort that Raytheon is engaged in. They were sure they were going to be chosen—General Hite and General Garner convinced me they were going to be chosen, but they weren't.

Since then there has been letter after letter from the New England delegation asking for an independent review, which I presume is in progress or has that been completed, General?

General FORSTER. It is in progress, but its results have not been totally blessed at OSD. They are still being coordinated at high levels within the Secretary of Defense's Office.

Mr. WILSON. I have never seen quite this kind of effort to overturn a decision made by the Army, Navy, or Air Force, but it is a spectacular effort by Senator Kennedy, Senator Smith and the rest of the New England delegation.

That naturally causes us a little bit of anxiety. I think Senator Kennedy persuaded Senator Inouye to write a letter asking you to go forward with EMD on both missiles.

We have made a decision based on what you said to us two years ago that the Army couldn't afford both missiles.

Are you going to go forward with EMD on both missiles?

General FORSTER. Probably not, sir. This is a Ballistic Missile Defense Office (BMDO) funded program, and we executed for them and will operate the systems for them as an Army system, but the R&D is funded by BMDO.

I don't believe that they provide us enough money to take both systems into EMD. They told us two years ago they would not.

I don't see anything that would change that. I don't see that their funding posture is any better.

Mr. WILSON. If you did go forward with both of them, it would have to come out of Army hide somewhere else, wouldn't it?

General FORSTER. Yes. We could not pay within the Army for the second missile to go into EMD.

Mr. MURTHA. Do you take any risk at all—it was explained to me there was a risk in going with the ERINT instead of the Patriot. I want to clarify the risk in the ERINT and Patriot programs. Is there any risk going one way or the other?

General FORSTER. The review team and the Army Systems Acquisition Review Council considered the risk to be about the same and not really a factor in choosing.

ERINT tended to be better against the theater ballistic missiles, the near-term threat, those that would come with the advanced warheads.

The multimode was better against a sophisticated cruise missile threat which we believe to be further out. There were pluses and minuses on both sides, risk on both sides. Risk was just not considered to be a discriminating factor. ———.

General FORSTER. Yes, sir, quite a ways down the road.

Mr. MURTHA. You will be able to overcome that with ERINT?

General FORSTER. Yes, sir.

ERINT has quite a capability against cruise missiles. To give multimode its due, it has exceptional capability against that particular threat.

Mr. WILSON. But the basic threat and the thing that started all of this was through BMDO, which was the threat, the battlefield, the threat of battlefield ballistic missiles?

General FORSTER. Absolutely. That is what the Army determined to be the most stressing threats and the threats that could do the most damage to our soldiers. Therefore, we wanted to pick a system that was best against that threat in the near term.

Mr. Wilson. Do you recall that Raytheon lobbied very hard last year to force the Army to go into engineering manufacturing development?

General FORSTER. Yes sir, I do.

Mr. WILSON. And tried to force that through this committee?

General FORSTER. I don't recall the exact committees, but I remember the effort well.

Mr. WILSON. They tried to interdict the regular BMDO Army decision-making and as a matter of fact this subcommittee kept that from happening.

Mr. MURTHA. Mr. Wilson kept that from happening—his influence with the subcommittee.

Mr. WILSON. But now that they have lost, they want to go ahead and build both of them, which last year they said should not be done.

The letter that you got from Senator Inouye—I don't know how the Deputy Secretary interpreted it but I have it here. It is not a directive. It just asks you to consider both of them. I would anticipate that the Senate might fund both of them, but if they do, they are going to have to take it out of something else and I would assume that the Department of Defense decided that they don't want to take out of Comanche, for instance.

General FORSTER. The Army would not support that. Let me say our preferred course of action two years ago and probably the ultimate best course of action is to take both of them in EMD, have both capabilities, mix them in a single battery and have the best of both worlds.

That was our preferred course of action.

Mr. WILSON. If you don't have a money problem.

General Forster. Right.

Mr. WILSON. How much money would it be to take them both into EMD?

General FORSTER. I don't know exactly. Let me answer that question for the record. I would be several hundred million dollars more over the POM, but I am not sure exactly what the numbers would be. I will take the question.

Mr. MURTHA. A quarter of a billion dollars?

General FORSTER. Well more than that. Several hundreds of millions of dollars. Maybe approaching a billion dollars by the time you did all the stuff to get it ready for production.

Mr. MURTHA. Over a five-year period?

General FORSTER. Yes, sir.

Let me answer that for the record to make sure we give you our best thoughts on that. It is not something we thought about.

[The information follows:]

The cost to put both the Multimode missile and the ERINT missile into Engineering Manufacturing and Development (EMD) would be on the order of one billion dollars. This is based upon the current estimate for the ERINT missile development program of $583 million and for the Multimode missile development program of $444 million.

Mr. MURTHA. Why do you say that was your best course of action when you say there was little risk once you made the decision to go with ERINT?

General FORSTER. Sir, we would always have to give the enemy a choice of different ways to die for his country.

LINE OF SIGHT ANTITANK (LOSAT)

Mr. WILSON. I think that makes sense.

I have a constituent that builds LOSAT. I have a question: If Javelin turns out to be as good as we think it is—is LOSAT in EMD?

General FORSTER. No, sir. LOSAT is in the technology base part of the ongoing effort in hypervelocity missiles, large kinetic kill missiles. It is not in EMD and is unlikely to go into EMD——

Mr. WILSON. If we had all the money in the world, we would put it in EMD, wouldn't we?

General FORSTER. Yes. We wouldn't have to have quite all of it, just most of it.

Mr. WILSON. It is hard to pick any serious weapon system that if we had the money we wouldn't do it.

General FORSTER. I think that there is a degree of common sense that plays in here in the sense that LOSAT has a different kill mechanism by kinetic energy kill and it is very difficult to countermeasure, but it is a heavy system, requiring an armored vehicle to be able to launch it fast, which makes it of less value to light forces.

So, yes, I would like to have both, but if I can only have one, I will pick the one of more general use.

I am not sure that I would want Javelin, LOSAT and something else. If we had all the money in the world, we would still try to be prudent managers for the taxpayer.

JAVELIN PROGRAM

Mr. WILSON. Is Javelin on track? Is there any significant problem?

General FORSTER. Javelin has done quite well.

It has finished its EMD program, had an operational test that was one of the best that we have seen. It kind of told us that we can get into focal plane array, forward-looking infrared systems with some confidence and that helped us accelerate the second generation FLIR program as well.

It had 88, 92 percent hits in live firings with soldiers and Marines during its operational test, weighs less than 50 pounds, and is generally meeting all of its performance elements.

The biggest complaint that came out of the OT was the fact that we need to make the field tactical training device, more durable.

If that is the best thing that you can learn and the hardest nut you have to crack in an extensive OT, you have done pretty well.

Javelin, we can't afford to build them at the rapid and quantity rates that we would like to so the program has stretched out and unit cost has gone up. It is still a good deal. We intend to buy 26,000 of those missiles, but it will take us longer to get there.

Mr. WILSON. Would you ask the Deputy Secretary of Defense if it would help him to get a letter from the Texas, Oklahoma, and Arkansas delegations every day supporting the decision——

General FORSTER. Let me ask the Acting Defense Acquisition Executive about that because he is the one I interface with on getting this decision through OSD and publicly announced.

Mr. WILSON. Tell him that I can get him a letter every day, get Senators Pryor, Bumpers, Hutchison. They will be glad to call and create a commotion if it will be helpful or if it is necessary to counteract what is coming down from Massachusetts.

General FORSTER. I will certainly make that offer to him, to Mr. Longuemare.

Mr. WILSON. When in your best judgment will the decision either be affirmed or negated?

General FORSTER. I think it is within a matter of days.

Mr. WILSON. Really?

General FORSTER. Yes, sir. I believe we have provided the last bit of information that they asked for and that is why I was a little obtuse in answering some of the questions because it is being reviewed at fairly high levels in OSD and I think a decision is within a week, ten days or something like that or the public announcement of it.

The decision may come sooner, but the public announcement is what I am hanging my hat on.

ERINT PROGRAM

Mr. WILSON. You have your big five and I notice this wasn't a part of it, but I consider tactical ballistic missiles as big a threat as there is to our soldiers, particularly the chemical aspects of it, because so many countries are able to do that.

In one test, ERINT avoids all the cannisters immediately where it couldn't have caused lethality to soldiers. If through Raytheon's efforts, they can persuade the authorizing committees and the Appropriations Committees to fund both of them, I am not hostile to that because I think the threat is so great, but I would be hostile to it if it meant that we were going to have to cut the Army back on some other very critical program.

I think this is such a big threat that if we can find the money somewhere, it is all right with me, but I think it is a little unseemingly, the intensity of the efforts to overturn the decision.

General FORSTER. Let me say something so that we don't mislead you on how important we think this is. We think Patriot Advanced Capability–3 (PAC–3) is absolutely key to our success and is a leading element in our protective force capability.

You don't see it in our future because we will already have it by the time we get to Comanche, THAAD, Corps SAM—this is a near-term capability we are looking for and we will have low, medium, and high altitude capabilities.

Corps SAM tends to be low and will overlap with Patriot, but has the ability to move with the forces. We elected to go with PAC–3 first because that is an approach capability with PAC–2.

PAC–3 would be intermediate.

PAC–3 UPGRADE

Mr. WILSON. Somebody told me and it might have been somebody with Raytheon, that there was a possibility that some of the foreign countries that we have talked to particularly in the Middle East, that there might be an upgrade there.

General FORSTER. That is entirely possible. Hawk has been a big seller in FMS to allies around the world. We were at risk when the Iraqis captured the Hawks we sold to Kuwait, so we had to be prepared to engage Hawks on our own.

There is a possibility that a consortium of countries could get together and fund an upgrade like Hawk.

Mr. WILSON. Poorer countries like Egypt?

General FORSTER. I think there is a potential for Hawk upgrade. We are not interested because that is money we would rather see put into Corps SAM. We will hang on with Hawk Phase III where we are now and try to go into corps SAM later as the ultimate replacement.

So we are not too interested in upgrade programs ourselves, but we could see a consortium of other nations that would do that.

Mr. WILSON. Thank you.

Mr. MURTHA. Mr. Visclosky.

COMANCHE PRODUCTION RATE

Mr. VISCLOSKY. If we could start with the Comanche, are the production facility and the contractors involved Sikorsky and McDonnell Douglas?

General FORSTER. Sikorsky and Boeing.

Mr. VISCLOSKY. Is there a problem with maintaining the existing production line until Comanche goes into production?

General FORSTER. There is a concern on Sikorsky's part that we are not buying Black Hawks after 1995. We will pick up the overhead—their estimate is $50 million. If I spread that over the $6 billion R&D program, it is not a very big burden for us to pick up. That is dependent on nobody buying more Black Hawks and the total burden going to Comanche, so the number will be less than that because we think there is a good FMS market for Black Hawks, and we would like to see them do more FMS sales.

Mr. VISCLOSKY. Without foreign military sales, are you concerned the Comanche will not be produced?

General FORSTER. No. The Chairman of Sikorsky said they are going to make Comanche happen. He was very sincere when he said that. I have never seen Mr. Buckley when he was not sincere. It is a burden for Sikorsky.

We will pick up up to $50 million or so in our program, and we will fund it, but it will happen.

Mr. VISCLOSKY. On Javelin, there was a report that there was a 72 percent unit cost increase in the last year; is that correct?

General FORSTER. There has been a big increase, and I am not sure of the percentage or year-to-year. As the world has changed and we are no longer facing the massive threat from the Soviet Union, there is no 48,000 Soviet tank threat out there to worry about in Central Europe, we reduced the quantity of Javelins projected by more than half from 58,000 to 26,000 or so. When you cut a buy in half and you still have——

Mr. VISCLOSKY. That was 59——

General FORSTER. Fifty-eight thousand to 26,000.

Mr. VISCLOSKY. Total buy?

General FORSTER. Total buy.

Mr. VISCLOSKY. Over how many years?

General FORSTER. At the same time we are reducing quantity, we stretched it out by five years, so we are buying them over a 18-year period now.

Mr. VISCLOSKY. Originally you anticipated 58,000 Javelins over 10 years, and you are at 26,000 for 18 years?

General FORSTER. Twenty-six thousand over 18, as opposed to 58,000 over 11. You can see that we have taken a huge reduction in efficiency from where the contractors were building up to produce Javelin. You just can't absorb that type of inefficiency without the price going up, and that has had more to do with driving the price of Javelin up than any single factor.

Most of the price increases have not been due to stretching it out over a number of years and buying a reduced quantity.

Mr. VISCLOSKY. Rate of production during those 18 years, would it be reasonably constant or a low rate of production for some years and full production in the outyears?

General FORSTER. Yes, sir. We build up slowly to an average rate of 800 to 1,000 missiles per year, through FY99, whereas we planned on buying up to 3,000 a year at one time.

Mr. VISCLOSKY. So you would be up to a rate of 1,000 missiles a year?

General FORSTER. Yes, and sustain it through the 1990s.

Mr. VISCLOSKY. Even if you bought 1,000 a year for five years, you are still 11,000 Javelins short from the 26,000 figure.

General FORSTER. We ramp up to over 2,000 per year in the outyears. So we will buy out to 26,600 but if you would like, I can provide the exact production profile for the record.

Mr. VISCLOSKY. If you would. I was under the impression that the program is slated to last a lot longer than 18 years.

General FORSTER. I think 18 years is the production flow now. So I may be off on the peak rates.

[The information follows:]

The Army hopes to decrease the number of production years to 14. Below is a 14 year procurement profile which the Army plans to incorporate into the Program Objectives Memorandum submission to the Office of the Secretary of Defense in June 1994.

Missile Quantity

Fiscal year:	
1994	703
1995	374
1996	633
1997	740
1998	703

1999	835
2000	1,200
2001	1,800
2002	2,600
2003	3,000
2004	3,450
2005	3,450
2006	3,556
2007	3,556
Total	26,600

Mr. Visclosky. That is still a large discrepancy even if you took 17 times 1,000, you are still 9,000 short on the number of Javelins.

General Forster. If you bought Javelin in the same quantity and at the same rate we bought Stinger, it would only be a little bit more expensive than a Stinger missile, unit cost of $77,000 for Javelin as opposed to $99,000.

STINGER MISSILE

Mr. Visclosky. How long was the Stinger in production?

General Forster. One version or the other, close to 20 years.

If you just took the first five years of Stinger and Javelin's first five years at the same rate we bought Stinger, the prices are comparable, so you can see the effect of stretching out the Javelin program.

Mr. Visclosky. So it would be unrealistic to assume you would be producing Javelin 20 years from now?

General Forster. Javelin is such a world class anti-tank weapon that we will have to deny some of our part-time allies from buying it from us. I mean, I think that if we open up FMS on the—imagine an infantry handheld weapon less than 50 pounds that can engage a tank in adverse weather at a range beyond which most tanks can engage you with their main gun. That is powerful stuff.

Mr. Visclosky. General, Congress last year provided additional funds for an enhanced producibility project to reduce the per-unit costs. I recognize what you are telling me about the Stinger and the Javelin, but at least for the foreseeable future, those days are gone; and I understand the per-unit cost scenario.

The contract was let last month. What is going to happen under the contract, what cost savings do you anticipate?

General Forster. Right now, we let the contract last month for the first $10 million and our 1995 request has the remainder, $13.6 million or so of what we are requesting in 1995 would go to finish the enhanced producibility program. We expect a five-to-one payoff, so $5 for every $1 spent payoff. So for the $23 million or so that we are going to spend in the enhanced producibility program, we will save $123 million or so dollars in production.

Mr. Visclosky. Would you provide for the record how that measurement will be calculated?

General Forster. Yes, we will.

[The information follows:]

The projected Enhanced Producibility Program (EPP) savings will be calculated by establishing a baseline cost for a component prior to the EPP based on Low Rate Initial Production I (LRIP) actual costs, then comparing it to the first proposed cost of a component after incorporation of the EPP changes. These costs will be adjusted using learning curve theory to represent the same unit number, both with and without the EPP. The costs are then subtracted to obtain a unit cost savings. This unit cost savings is then applied to the remaining units using learning curve theory. All components affected by the EPP are calculated similarly, then summed up to obtain a total EPP savings.

General FORSTER. We have already taken that money, that is how confident we are, so it doesn't show up in the Javelin program anymore. That is a conservative estimate.

Mr. VISCLOSKY. The contractors and the Army indicated they would like $55 to $105 million more to accelerate the program as far as acquisition and unit costs; is that true?

General FORESTER. Anything that we can do to increase production in the near term and go down the learning curve quicker to get to an efficient production rate would save us in unit cost in the long term. So $75 million would be a good number. It is unfortunate that you do it in little slices . To really get a savings in unit cost, you have got to invest a lot of money up front to get down the learning curve and get an efficient rate.

Seventy-five million dollars would be very useful in getting up to a more efficient rate. That is one of our priority unfunded requests; you know, if we were given an extra $2 billion, we would put some of that into Javelin to improve efficiency of that production. It is an affordability problem of how much money we can invest and how many units we can buy at any one time.

INDUSTRIAL BASE PROBLEMS

Mr. MURTHA. Some programs are slowing down, but we are buying unnecessarily because of the industrial base. To buy this out doesn't cause an industrial base problem?

General FORSTER. No, sir. There is no foreseeable way that we would be able to buy this out so fast it would cause an industrial base problem. That is beyond the realms of affordability to do that. It will be in production for 12, 15 years under the best of circumstances.

Mr. VISCLOSKY. First of all, the $55 to $105 million is not in your budget?

General FORESTER. No, it is not. We have money for Javelin production that would buy 374 missiles in LRIP II. That is not a very good rate even for a low-rate initial production on that.

Mr. VISCLOSKY. You buy 374 in fiscal year 1995 with the money that is in. If you were given, say, $55 million, how many Javelins could you buy?

General FORSTER. We could almost double that number, 700 to 800.

Mr. VISCLOSKY. General, following up on the Chairman's remark, the rates of production and the industrial base, I guess is a concern of mine with the Javelin, with all these programs. I visited two Army munition government contract facilities two weeks ago. We used to make a tremendous amount of flares at one facility and shell casings for artillery at the other; and suddenly, we make nothing. I am not castigating the Army for that, Congress appropriated the money. But suddenly there is nothing left.

My concern here—and I appreciate what you are saying about at least getting past the learning curve; the days of the Stinger are gone and somehow we have to look at all programs in terms of low-rate production from the first day.

General FORSTER. Yes, sir.

Mr. VISCLOSKY. Just forget about high rate of production or accelerating, concentrate on what the real world looks like, because it is disruptive to the companies, the military, and especially to small communities. Today there is nothing but this empty munitions plant in Carnack, Texas.

General FORSTER. You are right. That is one of the areas that we focus on as part of acquisition streamlining is to try to get the unit cost independent of the quantities breaking the cost-quantity relationship here. You will see that to a degree in the Comanche program where the unit cost of some molded composite parts is the same whether you buy one or 100, because the materials are basically simple composites, and you have already paid the tooling and the lay-up is the same, and the tooling is not that expensive. We are trying that with more and more systems where you don't invest heavily in huge amounts of machine tools that only pay themselves off if you buy 100 a month.

We are trying with the Bradley upgrade program to sustain that at a low rate of production and buy efficiently. You do that by having a lot of subcontractors involved with smaller plants and lower overhead, so that they provide more parts to you.

So we are trying to shape things in that way. It is hard to do, but we have to do it; you are right. We can be victims of our own efficiency,

Mr. VISCLOSKY. I place us, the Congress, the institution, the executive branch, the military in the same boat. If I heard one story, I dream about that, we made 30,000 of these per year through last year. Now we need none. People beg, let us make 6,000. There has to be a better way to do this. Focus on that problem as opposed to another $55 million to up the production rate, and then we can have everything come in five years from now and say, gee, you can't zero us out this year because we have this community, their plant, this expertise and all this stuff.

Mr. WILSON. Let me stick a question in, and then I will stop. ———

CORPS SAM

General FORSTER. We would have had Corps SAM for a number of years, well before that threat materialized.

Corps SAM has to compete for a limited number of BMDO dollars, too, and we are in the middle of that competition with a lot of good ideas. Corps SAM has a valid battlefield mission against short-range surface-to-surface missiles, low-altitude missiles, and can maneuver with our maneuver forces so we think there is a valid need here.

Mr. WILSON. Where Saddam Hussein felt constrained to use chemical weapons, the North Koreans probably wouldn't?

General FORSTER. We are concerned about that, and the sooner we have capability to engage that type of weapon, the better we will feel and the better prepared we will be to serve our country, because we don't want to put our soldiers in a position where the U.S. can be blackmailed with a few weapons of mass destruction.

Mr. WILSON. Thank you.

LONGBOW SYSTEM

Mr. VISCLOSKY. So I understand, and I know there are a number of questions for the record on the Longbow; is the Longbow an upgrade of the Hellfire missile or is that a separate system?

General FORSTER. It is an upgrade to the Apache helicopter with the fire control radar, but it has a new radar frequency guided Hellfire missile on it, so you buy new missiles with the Longbow radar frequency guidance system in them. But you do upgrade the helicopters.

Mr. VISCLOSKY. So the Longbow is essentially the launch component of the weapon, and you would upgrade the Hellfire to be launched from the Longbow?

General FORSTER. The Longbow has two components, a millimeter wave fire control radar that is integrated on the Apache helicopter, it provides great adverse weather fire and forget capabilities. It takes a radar picture of the battlefield, transmits the picture to the Hellfire RF seeker, so that it has a go-to position as well as a radar image to look for.

You fire the Hellfire off the Apache and turn the Apache around and come home, and eat your dinner and the Hellfire will find the target and hit it. It is a different missile, not a regular laser-guided Hellfire with just the guidance change. It is all new.

Mr. MURTHA. Did that Hellfire hit the target or not? In the Gulf War, the original assessment was that it was the first thing they fired, and it supposedly hit the target. Afterward action reports said it wasn't as accurate as we anticipated.

General FORSTER. It did great in the desert. You may be thinking about a training mission that one of the battalions had where they were firing at car bodies in the desert before the war started, and they were firing in rain, which was a unique environmental situation that we hadn't encountered, and had some back-scatter in it, and we had to do training so they could adjust where they put the cross-hairs in that environment.

I would say it has better than 80, 90 percent hit with the Hellfire. It took out the radar sites the first night. The videos are impressive. It hit it.

The RF, you don't have to hold the cross-hairs on the target all the time. Once you pull a trigger on the Longbow-Hellfire, it is gone. It is fire and forget.

Mr. VISCLOSKY. And the Hellfire is an armor-piercing weapon?

General FORSTER. Yes, sir. It has an exceptionally good tandem shaped charge on it, so will penetrate any known armor.

Mr. VISCLOSKY. The Hellfire has worked reasonably well, getting to the Brilliant anti-armor submunition, that will cost $151,000 each, from a cost-effectiveness standpoint, are you better off putting that money into the Longbow and the Hellfire mechanism?

General FORSTER. No, sir, they do different jobs. $151,000 seems high for a BAT submunition. BAT is a smart submunition delivered by a carrier. You basically put the BAT on an ATACMS Block II tactical missile system which guides it into a basket with some error in it, but the BAT ———

one submunition, and will pick up audio sound and home in on a target that is moving in that area; and as it gets closer, it will cut on an infrared seeker signal homing in on a vulnerable spot on the vehicle.

Its initial discrimination is done with audio so that can be programmed for different pressure levels. I can have BATs moving where it picks up audio from the acoustic signals of moving armored vehicles, tracks, and diesel engines, which is different than an audio from the wheels or a turbine engine. You can have a different set of algorithms and be discriminatory in what you attack.

The basic BAT goes after primarily the tracked vehicles.

Mr. VISCLOSKY. Could it be considered a longer-range weapon, and you don't place a crew in jeopardy?

General FORSTER. ———.

Mr. VISCLOSKY. It would discriminate between the sounds of our tanks' tracks and the enemy——

General FORSTER. You don't have to worry about us being that far in the rear. You could do that, but you would have to take a lot of data and do fancy processing but it is not a worthwhile exercise.

Mr. MURTHA. What is the degree of improvement that the Longbow makes to the Comanche? What would you say the advantage is? In my own mind, I am trying to establish why you're only building 400 Comanches with Longbows.

General FORSTER. The reason for that, sir, is that you can take the Longbow data from an Apache or Comanche equipped fire control radar and transmit to another aircraft without it, and they can still fire the RF-guided Hellfires.

Mr. MURTHA. It is not necessary to have Longbow on each of the helicopters

General FORSTER. Right.

Mr. MURTHA. So it is not a cost saving. Ideally, you wouldn't want it on every helicopter?

General FORSTER. That is a tough decision because you would be buying more maintenance and support issues if you put a fire control radar in every one. But then you would have a tremendous autonomous capability where you could go in all sorts of different directions, and every aircraft would be at the ultimate capability.

We found out one out of three ought to have a fire control radar is the best mix between affordability and effectiveness.

Mr. MURTHA. If you put 400 out, will that be one in three?

General FORSTER. Yes, sir. For example, we are building 1,292 Comanches and about 400 of them will have the fire control radar.

Mr. MURTHA. Go through the scenario of what is on the helicopter without Longbow. What is the radar?

General FORSTER. The Comanche has no radar unless it is a Longbow-equipped aircraft. It has a second generation wide field of view FLIR as its basic sensor.

Mr. MURTHA. What do you use for reconnaissance then?

General FORSTER. That FLIR, that is a very good capability.

Mr. MURTHA. It that as good as Longhow?

General FORSTER. You get more resolution, but it is at a shorter range and more attenuated by weather.

Longbow gives you a longer range through adverse weather, but you get a radar picture back that in any kind of close combat you would want to compare that radar picture with the FLIR picture as well.

Mr. MURTHA. The Committee is concerned about the B–1 program which we limited to $20.5 billion. There were a lot of improvements that we should have built into the B–1 but didn't.

What we are concerned about obviously is that it may cost more money in the short run, but be much more cost-effective in the long run; and I know there are cost constraints in everything we do, and I think decisions between ERINT and Patriot will be more prevalent as we go along, more decisions made between systems and services even. We hope you will think about some of the recommendations we have made about these systems, and if you have any other recommendations, let us know and we will be glad to see if we can adjust some other programs in order to take care of shortfalls that might in the long run be much more cost-effective.

General FORSTER. I appreciate that. Let me say just on the off chance that we don't have all the answers right now, every Comanche will be built to accept the millimeter wave fire control radar. Every one will have provisions to accept it, and that is built into the costs of the system.

Mr. MURTHA. Thank you very much General Forster. There will be additional questions for the record.

The Committee will adjourn until 10 o'clock tomorrow.

[CLERK'S NOTE.—Questions submitted by Mr. Dicks and the answers thereto follow:]

RAH-66 COMANCHE

Question. In a recent report, the General Accounting Office (GAO) concluded that "Comanche's overall program cost had grown to more than $35 billion with an estimated unit cost of more than $27 million. Can you update the committee on your projected Comanche Program Acquisition Costs and Unit Flyaway Cost?

Answer. The Current estimate for the Comanche program acquisition costs are $25.3 billion in fiscal year (FY) 1988 constant and $44.3 billion escalated dollars. This assumes a procurement of 1292 aircraft with a peak production rate of 120 per year, of which 431 are configured with a Millimeter Wave Fire Control Radar. The corresponding program acquisition unit costs are $19.6 million in FY88 constant and $34.3 million in escalated dollars. The unit flyaway cost estimate is $10.5 million in FY88 constant dollars and $20.6 million escalated dollars.

Question. Are there unresolved technical risks which could make future cost growth likely?

Answer. The Comanche Program has concentrated on risk reduction since the initial contract in 1984. Our goal at that time was to establish a program of moderate risk when entering Engineering Manufacturing Development. That goal has not changed and nothing is being contemplated in the streamline program effort to increase technical risk. There are no unresolved technical risks that portend of future growth.

Question. Is the Army's Operation and Support (O&S) cost projection attainable?

Answer. Yes. For example, there is a 2.6 maintenance man hour per flying hour (MMH/FH) specification for Comanche; recent analysis has shown that the Comanche should achieve 2.4 MMH/FH. If, however, Comanche exceeds that goal, those components not demonstrating predicted reliability will be re-designed and retrofitted insuring that overall O&S costs would not increase. Another key to Comanche's projected low O&S costs is the high percentage of self diagnostics; 95 percent fault detection and 98 percent fault isolation; which will be demonstrated in FY02.

Question. Why do we need Comanche? Can't the current helicopter fleet be product improved to fulfill the mission requirements?

Answer. Army combat helicopters' contribution to the Nations' New Defense Strategy is due to the helicopter's inherent capabilities of deployability, lethality, versatility, and survivability. Armed combat helicopters are a means by which the Army can project power rapidly, fight with a high probability of success, sustain minimum casualties, and rapidly disengage. Army combat aviation combines intelligence, maneuver, and firepower at a rapid tempo over great distances. However, these basic helicopter attributes cannot be fully realized on the modern battlefield without aircraft modernization programs, of which, the Comanche helicopter is the cornerstone.

The most significant deficiency in Army aviation today is Armed Reconnaissance. It is the ability to provide critical, near real-time battlefield information for the tactical commander. Winning the information war means winning the battle. Lessons learned in Operation Desert Storm underscore the fact that our current fleets of Vietnam era reconnaissance (OH–58A/C Kiowa) and light attack helicopters (AH–1 Cobras) are tactically and technologically obsolete when performing this critical mission. These aircraft have limited night/adverse weather capability, obsolete navigation systems and minimal targeting capability. They are maintenance and support intensive, and lack the power, range, and endurance necessary to win and survive on the modern battlefield. The more modern OH–58D Kiowa Warrior is an armed scout, but like the AH–1 Cobra, it too has reached its technological limit. It can no longer be modified to meet the requirements of the 21st Century battlefield. Its firepower it limited to four Hellfire missile at sea level, and its flyable range is only 210 nautical miles.

The current cavalry aircraft fleet represent technology over twenty years old that is not cost effective to upgrade. Even with the most costly technological insertion, they cannot equal the capability of the Comanche. The OH–58H is a bridge to the Comanche; the rest of this Vietnam era fleet must be retired.

Comanche is the system optimized to perform a most demanding and difficult mission, armed reconnaissance in the cavalry. Comanche will be the eyes and ears of the battlefield commander. It will have the capability to self-deploy up to 1,260 nautical miles. It will see without being seen, provide essential tactical information to commanders, and influence the battle carrying up to 14 Hellfire missiles. The crew can contribute directly to control of the maneuver battle through digital information and communication data links. They will provide situational awareness over a large area for a small force. Comanche is an optimal system for force projection into a non-mature theater, and for strikes against fleeting targets.

The Comanche has proven to be the most cost and operationally effective solution to the problem of modernizing aviation for the 21st century. Comanche leverages high technologies for the smaller power projection force. The investment in Comanche will allow our Army to remain the best in the world.

Question. Please share with the Committee your current cost, schedule, weight and design to cost status.

Answer. The details of the new Comanche streamline program are still being finalized for presentation to the Office of Secretary of Defense (OSD) in May 1994. The current schedule and estimate, pending finalization, is as follows: The total program acquisition cost is $25.3 billion in fiscal year (FY) 1988 constant ($44.3 billion escalated) dollars. Unit acquisition cost is $19.6 million FY88 constant ($34.3 million escalated) dollars. Unit flyaway cost is $10.5 million FY88 constant ($20.6 million escalated) dollars. The estimates in constant dollars are basically the same as the pre-streamline program (discussed elsewhere); the difference in escalated dollars is due to a change in the OSD escalation factors.

The projected Comanche schedule is relatively unchanged. First flight is still scheduled for 1995, the low rate production decision will be made in FY00/01, and Initial Operational Capability (IOC) is still scheduled for FY03.

Comanche weight projections are watched very closely and Comanche weight is under control. Some weight/dollar tradeoffs are being considered in the streamline program, however; and some changes to the Comanche weight goals may occur. The current weight empty goal is 7,765 pounds.

The design to cost program for Comanche is also in place. The current design to cost contractor status shows $9.8 million FY88 constant dollars against a $9.2 million goal.

Question. Briefly describe the streamlining effort with this program. How can you save the taxpayer money while maintaining a manageable level of program risk?

Answer. The objective of the streamline program was to create a more efficient Comanche development program. To accomplish this, we are attempting to eliminate non-value added tasks. Reviewing laws, regulations, and policy to determine if waivers might be appropriate, applying commercial practice where possible and using simulation to the fullest extent practical. We will not degrade the capabilities of the weapon system nor allow the program risk to become unmanageable.

Question. Opponents of this program try to compare the Apache with the Comanche—can you clarify for the Committee once and for all the important different technologies, mission capabilities and costs between these two aircraft?

Answer. Comanche and Apache complement one another on the battlefield. One (the Apache) is large and powerful, the other (Comanche) is agile and sleek (low observable). The Apache is best used from a distance and the Comanche has the ability to get in close, find out what the enemy is doing, and prevent the enemy from finding out what our forces are doing. The Apache is the Army's premier attack helicopter. Its primary purpose is to destroy a large number of targets from standoff ranges, and is therefore much heavier than the Comanche (17,650 vs 10,600 pounds gross weight) and carries a large (16 Hellfire) and lethal weapons payload. The Apache is a 1970's technology aircraft. Comanche will be a state of the art technology aircraft when fielded in 2003 and beyond time frame. The Comanche's primary role is reconnaissance, searching, locating, and passing on threat information in close proximity to the enemy forces. The low observable characteristics (low radar, visual, infrared, and acoustic signatures), superior target acquisition, and communication/navigation technologies enable the Comanche to perform this critical mission. The Comanche superior deployment characteristics (self deployment and ease/number of aircraft that can be airlifted) provides the Army with a quick reaction light attack capability also. In summary, the battlefield deficiency that Comanche fills is not in any way reduced by the basic or upgraded Apache aircraft. The Vietnam era AH–1 and OH–58A/C are tactically and technically obsolete and must be replaced. A unit cost comparison is provided here:

FLYAWAY COSTS

[Fiscal year 1994 constant dollars]

		Basis
Comanche	12.8 million (10.5 FY88)	1292 @ 120/year
with Milimeter Wave Fire Control Radar (FCR).	14.6 million	431
Apache (AH–64A)	12.2 million	811 purchased
Longbow (mod to AH–64A)	4.5 million—aircraft mods	758 aircraft
	2.5 million—FCR	227 radar systems

Note: Longbow costs are modification costs to an existing aircraft. The flyaway cost for purchasing a new AH–64D Apache with a Longbow FCR would be less than the sum of AH–64A and Longbow costs.

Question. What is the impact of the current overall funding on the future readiness?

Answer. The Army's readiness and its ability to achieve Land Force Dominance by overmatching technological capabilities through continuous modernization are critical factors as the 21st Century approaches. Our analysis indicates a minimum annual funding level of approximately $12 billion is required in research, development, and procurement to ensure that the Army is modernized during the first decade of the next century. A lower research, development and acquisition funding level would jeopardize the safety and security of our most treasured asset—our soldiers. The minimum annual Army total appropriation needs to be approximately $61 billion, plus inflation, plus pay raise, and an increase in modernization, to reduce the Army's major affordability problems and future readiness concerns from fiscal years 1996–2001. This minimal level of funding will ensure a stable budget which is affordable and will ensure overmatching technological capabilities within a 10 Division Force.

[CLERK'S NOTE.—End of questions submitted by Mr. Dicks. Questions submitted by Mr. Wilson and the answers thereto follow:]

DIGITIZATION PROGRAM

Question. As I understand it, the Army has a goal of digitization of the battlefield by the year 2000. I applaud this effort which has as its objective more capable, though smaller, Army forces. Please explain how you intend to execute your plan and how are the requirements for this plan to be developed? Is there a proven solution available which can actually be fielded before the end of this century?

Answer. The Army is establishing the Army Digitization Office (ADO) to integrate, coordinate and synchronize all Army digitization efforts. The Army is determining the requirements by exact type and number of platforms to be digitized. Tentatively, it is planning to digitize all platforms belonging to shooters (e.g. tanks, Bradley Fighting Vehicles), all leader platforms and command and control nodes, as well as selected combat support/service support elements (e.g. medics, recovery vehicles). The Army is producing, or will soon produce, M1A2 tanks, M2A3 Fighting Vehicles, M109A6 Paladin Howitzers, Apache C/D helicopters, and the Command and Control Vehicle (C2V) with embedded digital capabilities. However, due to funding constraints, the Army cannot procure these vehicles in sufficient quantity or quickly enough to provide this capability across the force before 2012. Therefore, the Army is designing an appliqué consisting of a computer unit, a position/navigation device and a communications interface that will be integrated into existing, non-digitized platforms (e.g. HMMWV, M1A1 tanks). The use of an appliqué should allow the Army to field a digitized Brigade in '96, a Division in '97 and a Corps in '99. The Army is developing an architecture that outlines the information needed by specific platforms and equipment, and the functionality required to integrate among platforms, organizations, and levels of command. There is no one proven solution for the appliqué. The Army is exploring several versions of appliqué design including militarized, ruggedized, and commercial-off-the-shelf. It may also necessitate the development of a better data distribution system and better software.

Question. The Defense Department as a whole has an uneven history of attempting to develop software driven systems that promise much and deliver little in the way of fielded capability. As I recall the Army also has a mixed record in the successful implementation in the command and control arena. How do you plan to prevent this from happening with battlefield digitization? Which agency have you put in charge of actually developing systems which will be fielded on time and on budget? Have you selected the prime contractor for this program and if so, who is it?

Answer. Functionality will be based upon lessons learned in the past as well as iterative experiments with the Training and Doctrine Command (TRADOC) Battle Labs to ensure that the product meets the user's performance requirements. The recent National Training Center (NTC) 94–7 rotation is the most recent experiment. The Army intends to procure hardware tailored in several variants; militarized, ruggedized, and commercial-off-the-shelf. This hardware will be current state-of-the-art computer processors with growth potential for future upgrade. In the near future, common software will be specified for both embedded and appliqué systems. The Army will conform to the joint staff and Office of the Secretary of Defense (OSD) specifications for the protocols and messages to be implemented. The goal is an open system architecture with no proprietary hardware or software. Modular hardware and software will be designed for future growth and forward compatability with commercial standards. The Army will compete this technology to ensure the best available product.

The Army Digitization Office will coordinate and integrate digitization into the Army. It will enforce common standards and provide the necessary direction to ensure the development of a common and interoperable solution.

The Army has no plans to select a prime contractor for this effort. It will use the Army Material Command to provide the systems engineering support for the effort.

[CLERK'S NOTE.—End of questions submitted by Mr. Wilson. Questions submitted by Mr. Sabo and the answers thereto follow:]

ADVANCED COMMAND AND CONTROL VEHICLE (C2V)

Question. In the fiscal year (FY) 1994 Defense Appropriations Act, Congress provided $10.654 million for the Advanced Command and Control Vehicle (C2V), of which $2 million was only for integration of the vehicle intercom system and mission module.

I understand the Army has found the current intercom to be deficient, and has revised its requirement for the component.

General Forster, what is the status of the C2V program, and of the intercom system in particular?

Answer. On December 21, 1993, the Army System Acquisition Review Council (ASARC) authorized the C2V program to enter Engineering and Manufacturing Development. As part of that decision, the Army Acquisition Executive authorized the award of a sole source contract for the chassis and enclosure and a competitive contract for the intercom and mission module systems.

As you indicated, the intercom used during the European testing (August 1992 through April 1993) was inadequate for our needs and the Operational Requirement Document was revised to reflect our changed requirements. The program approved by the ASARC provided for acquisition of an improved intercom system under the Mission Module System contract. The Mission Module System contract is currently in the procurement process. To date, this effort has maintained the schedule established at the time of the ASARC review. The Request for Proposal was released on April 8, 1994. The Source Selection Evaluation Board will meet on May 23, 1994 with an anticipated contract award by early September.

The FY94 effort continues under the Bradley System Technical Support contract which has supported the advanced development work on this program since its inception in 1992. The FY95 to FY97 sole source contract for the chassis and enclosure is also on schedule. Contract negotiations are ongoing with contract award expected by the end of August.

Question. Has the $2 million added by Congress been released for use by the Army? If the funds are not released soon, will that affect the schedule for the C2V?

Answer. The $2 million added to the C2V program by Congress were released to Program Manager, Bradley Fighting Vehicle on April 20, 1994. The program schedule will not be affected.

ELECTRIC ARMAMENTS

Question. For several years, Congress has added funds for research into electric armaments, such as electromagnetic and electrothermal chemical guns. The Army, Navy, and Defense Nuclear Agency are all involved in this research. I understand the Army Science Board recently reviewed electric gun technology. Can you provide the Subcommittee with the results of that review?

Answer. The Army Science Board (ASB) held a technical review of the Electric Armaments program on March 14, 1994. To date, the ASB has not published the official results of the review. However, The ASB issued four questions/comments to be addressed by the Electric Armaments community prior to issuance of a final report. The questions/comments are as follows:

a. What is the utility of the 9 megajoule Skid Gun Program?

b. What firing profiles can the Focused Technology Program (FTP) contractors support without need for the development of a new prime power source? Will the user support these firing profiles?

c. What is the user's level of interest in the Cannon Caliber Electromagnetic Gun (CCEMG) Program?

d. Electro-thermal chemical (ETC) development activities remain on track.

Answers to the above questions are being prepared by the Electric Armaments and user communities and will be fully addressed for consideration by the ASB before it issues its report.

Question. According to reports I have received, recent tests of the electro-thermal chemical program have been quite positive. How will these results be factored into the program?

Answer. The Army electro-thermal chemical (ETC) program strategy is to monitor and support Navy and Defense Nuclear Agency ETC development. Recent ETC results have been more positive than those previously obtained although the experiments still require significant electrical energy. These results will enable the Army to maintain its modest ETC anti-armor development efforts (approximately $1.4 million/year) in high energy density propellants, and system repeatability at weapon levels. Based upon the demonstrated maturity of electromagnetic and ETC technologies as well as expressed user support, the Army will decide which technology to develop further: ETC, large caliber EM, cannon caliber EM, or a combination of technologies.

Question. Could you provide an update on the Cannon Caliber Electromagnetic Gun (CCEMG) system?

Answer. The goal of the CCEMG has been to design and develop a cannon caliber electromagnetic technology demonstrator for potential applications to both Army and United States Marine Corps light armored vehicles. The following activities represent an update of the program:

a. Conventional launch of CCEMG sub-scale projectiles at CCEMG velocities was successfully completed.

b. Successful launch of initial CCEMG projectile designs from CCEMG launcher was obtained.

c. Initial autoloader testing was successfully completed.

d. Design and fabrication of hardware has been nearly completed, with assembly and testing approaching 50% completion.

e. Jump (launch sensitivity) tests are scheduled to commence in June 1994.

f. System testing is anticipated to begin in summer 1995, with the technology demonstration expected to be completed by 2nd quarter, fiscal year (FY) 1996.

Question. Has the Department released to the Army the $2.5 million that Congress added to last year's budget for the CCEMG program? What will these funds be used for? Is your request for FY95 sufficient to accomplish the proposed FY95 program? If not, how short are you?

Answer. The Army has received $3.0 million that Congress added to the FY94 budget for the Electric Armaments Program, which included $1.5 million for the CCEMG program. The sum total ($4.5 million) of these funds was redirected for Omnibus reprogramming. The FY95 request is sufficient to accomplish the planned program.

(CLERK'S NOTE.—End of questions submitted by Mr. Sabo. Questions submitted by Mr. Livingston and the answers thereto follow:]

NUTRITION RESEARCH

Question. Last year, both the House and the Senate provided $1.75 million in the fiscal year (FY) 1994 Defense Appropriations bill in three specific program elements (Defense research sciences, medical technology, and medical advanced technology) for ongoing research projects at the Pennington Biomedical Research Center. As I understand, very little of this funding has been provided to these ongoing projects. Is this true? These are projects of Congressional interest, have the subcommittees been notified of any changes in FY 1994 funding for these projects?

Answer. $1.5 million of the $1.75 million was released to the Pennington Biomedical Research Center on May 6, 1994. The balance will be released when the Department of Defense Comptroller grants authority to obligate the funds.

Question. Has the Army requested the release of these funds? If not, why not? When will this occur?

Answer. The Army has requested and expects the release of the balance of the nutrition research funds by May 31, 1994.

Question. Provide for the record an update of the significance of the research being conducted for the Army and DoD at Pennington.

Answer. The 1994 Defense Appropriation Bill provided $1.75 million for the U.S. Army Medical Research, Development, Acquisition and Logistics Command (USAMRDALC) to continue funding of a nutrition research program at the Pennington Biomedical Research Center in Baton Rouge, Louisiana. This grant funds six research projects:

1. Stable Isotope Laboratory—This laboratory was established to provide analytical capacity for non-obtrusive determination of energy expenditure, water intake, and changes in total body water of soldiers in the field. This program has been highly successful and continues to support U.S. Army Research Institute of Environ-

mental Medicine (USARIEM) nutrition field studies during high energy expenditures in environments of extreme cold, high altitude, and survival, Ranger and Special Forces training.

2. Clinical Nutrition Laboratory—This project continues to provide outstanding analytical laboratory support for the biochemical assessment of nutritional status in USARIEM field and laboratory studies. These included studies of female soldiers in basic training, Ranger students and instructors, Special Forces candidates, and Special Forces soldiers housed at the Pennington Center.

3. Diet, Neurotransmitters, and Behavior—The purpose of this project was to initiate a basic nutritional neuroscience research program to investigate the mechanisms involved in nutritional modulation of higher brain functions and behavior. This is of great interest to the Army because of recent studies indicating that tyrosine, a nutrient found in protein, may be an effective countermeasure to anxiety, mood deterioration, and other stress related performance decrements in soldiers, particularly during cold and altitude exposures.

4. Menu Modification Project—The objective of this project was to develop modifications of existing Army garrison menus and recipes with the goal of reducing fat, sodium, and cholesterol and maintaining or improving food acceptability.

5. Human Attention and Cognitive Performance Under Conditions of Sleep Deprivation—This project includes two studies which focus on the effects of nutrients and other substances which may effect human attention and cognitive performance under conditions of sleep deprivation. Sleep deprivation is a serious concern to the U.S. during sustained and continuous operations.

6. Metabolic Unit Project—The unit houses up to 12 soldier volunteers in the Pennington Center for 30 day studies. In this past year, a highly successful study was completed with soldiers from the Special Operations Forces to examine the effects of different carbohydrate sports drink regimens on metabolic responses during exercise and on time to exhaustion. This is the first part of an effort to evaluate the value of tailoring nutrition to an individual's metabolic requirements.

(CLERK'S NOTE.—End of questions submitted by Mr. Livingston. Questions submitted by Mr. Skeen and the answers thereto follow:]

HIGH ENERGY LASER SYSTEMS TEST FACILITY (HELSTF)

Question. The Army has elected to close the HELSTF facility at White Sands Missile Range, New Mexico and does not request funds for it in fiscal year 1995. The Congress has twice directed the Department to report on its long-term plan for the facility. The most recent deadline was January 1994, but the Committee granted an extension until March 1994. The Army still has not reported to the Committee. Why is the Army ignoring Congressional direction to report on its HELSTF plans?

Answer. The fiscal year 1993 (FY93) Appropriations Conference Report acknowledged that the Department of Defense's (DoD) future testing schedule for HELSTF was uncertain, and directed the Department to submit a report on current/projected workload as well as long-term options for facility utilization. The Army prepared and submitted this report to the Office, Secretary of Defense

(OSD) in June 1993, recommending that the HELSTF be closed. OSD delayed sending the report to Congress at that time due to their on-going survey to determine potential commercial and nonDoD HELSTF workload, as well as Congressional action on the FY94 budget request. In the interim, the FY94 Appropriations Conference Report again directed that DoD submit the requested report by 15 January 1994. The Army complied by re-verifying the data in the June 1993 report and submitted the report to OSD on 12 January 1994. No additional high energy laser workload was identified or added to the report. In order to conduct a more thorough assessment of the facility options and their associated costs, OSD requested that the due date be extended to 15 March 1994. OSD now desires to combine the submittal of the Army report with that of the Congressionally mandated "High-Power Laser (HPL) Program Guidance." Due to the various issues associated with the HPL report, it is not expected to be submitted to OSD until the end of May 1994. Given an additional thirty days for the review and integration of these two reports, OSD would then submit a consolidated Army-HPL report by the end of June 1994.

Question. How can the Army make the decision to close this facility prior to submitting the required report to Congress?

Answer. In light of the diminishing workload experienced at HELSTF in recent years, OSD conducted a potential workload survey of the Army, Air Force, Navy, NASA, and the Departments of Energy and Commerce. A brochure describing HELSTF's capabilities was provided to each addressee on 14 June 1993, requesting responses by 9 July 1993. Additionally, OSD published a notice in the Commerce Business Daily on 6 August 1993 in an effort to identify potential users of the HELSTF facilities. Results of these surveys identified no additional test programs beyond the two already funded and scheduled (Navy Point Defense Demonstration; AF Airborne Laser Target Lethality test). Both of these tests will be completed by the end of fiscal year 1994. HELSTF is conducting yet another survey to identify funded work for fiscal year 1995 and beyond, and once completed, the Army will coordinate its findings with the Congressionally mandated "High Power Laser Program Guidance" report. However, any optimism must be tempered by reality. The reality is that similar investigations have not identified funded programs requiring HELSTF support. Until concrete evidence of funded programs requiring HELSTF appear, the only prudent course is to continue to plan for closure. The Army cannot afford to maintain a test and evaluation facility when a funded present and future customer base does not exist.

Question. Has the Army coordinated this decision with the other services, who appear to be big users of HELSTF? Has the Army explored getting the other services to reimburse it for use of HELSTF?

Answer. In May 1993, the Army offered the Navy the opportunity to own or operate HELSTF in order to support its Point Defense testing, but the offer was not accepted. As part of the workload survey, each of the Services, NASA, as well as the Departments of Commerce and Energy were made aware of the intent to close the facility unless additional funded workload could be identified. With regard to reimbursements for HELSTF usage, the Army is reimbursed by the other Services in accordance with DoD Directive 3200.11, which requires reimbursement of all direct test costs.

[CLERK'S NOTE.—End of questions submitted by Mr. Skeen. Questions submitted for the record and the answers thereto follow:]

RESEARCH, DEVELOPMENT, TEST AND EVALUATION BUDGET

Question. The Army Research, Development, Test and Evaluation (RDT&E) request is $5.3 billion for fiscal year 1995, which is three percent less than the fiscal year 1994 appropriation. Yet the RDT&E requests of the other services have increased over the previous year. In addition, the Army's RDT&E request for fiscal year 1995 is only 15 percent of the RDT&E budget, whereas the Navy's share is 25 percent, the Air Force's is 34 percent, and the Defense Agencies' share is 26 percent. This is the same position the Army was in last year. Why is the Army's request the only one to keep decreasing?

Answer. The Army's Research, Development and Acquisition appropriations have been used to maintain short term readiness (operational training tempo), in order to ensure the success of ongoing and future unfinanced operational missions for which the Army has been the service of choice.

Question. The Army is terminating 53 Research, Development, Test and Evaluation (RDT&E) and procurement programs in the future years defense plan, including the Stinger missile and the Stingray. Were these programs terminated due to budget constraints?

Answer. Yes, the decisions on all of the program terminations were affordability based.

Question. How were they selected for termination?

Answer. The programs least crucial to the attainment of the Army's modernization objectives were the ones selected for termination.

Question. What will be the impact of these terminations on the ability of our troops to fight?

Answer. Our soldiers will continue to be provided with equipment possessing current and old technologies. This generally means that any technology edge related to those systems that we now enjoy will erode, eventually reversing the superior relationship with opposing forces' equipment.

Question. If the Army had additional RDT&E funds, which systems could be accelerated or initiated by the Army in order to field modern systems sooner?

Answer. There are two categories of programs which should receive additional funds if they were to be made available. First, those that would accelerate digitization of the battlefield are the M1A2 Abrams Upgrade, the Armored Gun System (AGS), the Army Digitization Office, the Battlefield Combat Identification System, and the Global Positioning System. Secondly, those that would enhance the warfighter are the Air Traffic Navigation and Integration Controls System (ATNAVICS), Longbow Hellfire, Brilliant Anti-Tank Munitions (BAT), and the Armored Gun System (AGS).

Question. What are the Army's top five priorities in terms of RDT&E programs?

Answer. The top priorities within the RDT&E programs are the M1A2 Upgrade, AGS, ATNAVICS, Longbow Hellfire, and BAT.

DIGITIZATION PROGRAM

Question. Digitization is an Army initiative to give dissimilar weapons systems (tanks, aircraft, command and control vehicles) the ability to communicate with each other throughout the battlefield. The Army believes that better sharing of information can reduce friendly fire and increase enemy kills. The Army has requested $76 million for digitization in fiscal year 1995. Please describe the benefits of digitizing the battlefield.

Answer. Digitization is a force multiplier. It provides a cost effective means of enhancing combat power through the exchange of digital information across the battlefield. Digitization offers two major advantages for the Army on the future battlefield. The first of these is a shared situational awareness among all friendly elements. This provides each system and their associated command cells with a common picture of their battlespace. At the system level this will significantly reduce the possibility of fratricide. It allows leaders and commanders at all levels to make rapid decisions and increase the tempo of the fight by getting the right information to the right person in near real time. The second advantage is the ability to synchronize forces in real time, vastly multiplying the combat power brought to bear into the fight, even on the move.

Question. The Army is planning two types of digitization—"appliqué" to be added to deployed systems and "embedded" to be incorporated into systems being developed. This makes tracking the total cost of digitization difficult. Is the $76 million requested for digitization in fiscal year 1995 for appliqué or embedded systems or both?

Answer. The $76 million will allow the Army to pursue both. The Army will develop three types of appliqués for experimentation that have varying degrees of hardening depending on the vehicle or weapon system. Fiscal year 1995 funding will be used primarily for these appliqué systems. The Army will also develop software for the appliqué. Eighteen million dollars is designated for upgrades to the Intervehicular Information System (IVIS) on the M1A2 tank, an embedded digital capability.

Question. How much is included in other program elements for either appliqué or embedded digitization efforts? Please provide a breakout by program element.

Answer. The Digitization Special Task Force has reviewed all Army programs during the past four months and is completing work on the definition of a coherent and comprehensive program. Currently, no funds are included in other program elements for appliqué systems. Digitization funding for embedded systems is contained within the Research, Development, Test and Evaluation (RDT&E) and procurement lines of each specific system. For instance, the M1A2 tank is equipped with the Intervehicular Information System (IVIS) which, in part, brings digital information to and from the tank. Because IVIS also functions as the electronic brain of the tank, a cost of that system is difficult to separate from the M1A2 cost as a whole. Nonetheless, in looking at all the currently funded programs that may be included in the Army's digitization architecture, the Army has identified approximately $6.8 billion through the 1996–2001 Future Years Defense Plan in these various programs that possess digital information systems. The identification of these programs is simply a management tool for the Army Digitization Office to better integrate the Army's overall digitization strategy. This list is a rough estimate which will be refined in the year ahead as the Army further defines its digital architecture. My staff will discuss this in greater detail with you at your convenience when the precise architecture is finalized in the coming year.

Question. A news article indicates that the Army's future year defense plan includes $1.7 billion for embedded and $372 million for appliqué systems. However, the future year defense plan that the Committee received identifies only $113 million for digitization through fiscal year (FY) 1997 and nothing past that. What accounts for this difference?

Answer. The $1.7 billion referenced was an initial, rough order of magnitude estimate of funding for all Army digitization efforts for FY 1995–1999, not just for embedded systems. The $113 million is for Research and Development, and $258 million is procurement money contained in the Abrams upgrade program budget line. The Research, Development, Test and Evaluation (RDT&E) funding will provide for the development of appliques, software, M1A2 Intervehicular Information System (IVIS) upgrades, user experimentation, and development of a data distribution system. The procurement money will fund appliqués, software and Battle Lab Experimentation through FY 1999. The Army has many programs that use information technology. An Army Digitization Special Task Force has recently reviewed all Army programs for digitization implications. The current challenge is to focus and direct digitization efforts toward a common architecture thereby maximizing the value of systems on the battlefield.

Question. If digitization is so important to the Army, why isn't more included in your future year defense plan?

Answer. Digitization is absolutely critical to the Army. As mentioned before, the Army has recently completed a review of all its programs in the Future Years Defense Plan which includes approximately $6.8 billion in RDT&E and procurement efforts directly related to digitization. Digitization is a set of programs with the majority of the funds residing in program elements and procurement lines for discrete systems which are included in the Future Years Defense Plan. The digitization portions are inextricably entwined within the funding lines, which makes a discrete dissection and identification of those funds extremely difficult. In July, the Digitization Special Task Force will be disbanded and the Army Digitization Office will be established under the direction of a Major General. This new office will direct and focus all Army digitization efforts.

Question. Is digitization realistic in view of the Army's decreasing RDT&E budget?

Answer. Digitization is a realistic, achievable, and cost effective means of enhancing combat power through the exchange of information across the battlefield. The decreasing RDT&E budget makes digitization an imperative by leveraging advanced technology with the investment in current weapons platforms.

Question. Why is digitization so important to other needs?

Answer. Digitization is a force multiplier. It provides a significantly enhanced capability for combat units by gaining maximum benefit from all systems not just specific platforms. It allows commanders at all levels to increase the tempo of the fight by getting the right information to the right person in near real time. Digitization will provide battlefield commanders at all levels a common picture enabling them to bring all their assets to bear in the fight, even on the move. Due to limited resources, the Army is not fielding new weapons systems in enough quantity for the entire force and must therefore leverage technology innovations by horizontally inserting them into current weapons platforms.

Question. Which weapon system does the Army foresee digitizing? How will the Army decide which need digitization?

Answer. The Army is currently determining the exact type and number of platforms to be digitized. Tentatively, it is planning to digitize all platforms belonging to shooters (e.g. tanks, Bradley Fighting Vehicles), all leader platforms and command and control nodes, as well as some combat support/service elements (i.e. medics, recovery vehicles). The Army is producing or will soon produce M1A2 tanks, M2A3 Fighting Vehicles, M106A6 Paladin Howitzers, Apache C/D helicopters, and the Command and Control Vehicle with an embedded digital capability. However, due to funding constraints, the Army cannot procure these vehicles in sufficient quantity or quickly enough to provide this capability across the force before 2012. Therefore, the Army is designing an appliqué consisting of a computer unit, a position/navigation device and a communications interface that will be integrated into existing, non-digitized platforms (e.g. HMMWV, M1A1 tanks). The use of an appliqué should allow the Army to field a digitized brigade in FY 96, a Division in FY 97 and a corps in FY 99. The Army is developing a draft architecture that lays out digitization requirements between and among weapons platforms, organizational levels and levels of command. The architecture will outline the information needed by specific platforms and the functionality required to integrate among platforms and organizations. This laydown will be developed and used by the Training and Doctrine Command to identify specific information requirements both vertically within, and horizontally between, Battlefield Functional Areas. The detail of the architecture and assessment of information exchange requirements will give us a clear picture of which systems, and to what degree, require digitization.

Question. Is the Army assessing how much information is appropriate to share between the operators of each system?

Answer. Yes, this is an ongoing process. For example, the Army realized that the tank commander was already required to deal with an overwhelming amount of information. The Intervehicular Information System, the first step towards digitization, was designed to specifically relieve the tank commander of some of that information burden. Examples of some of the shared information include: friendly position locations, maps, graphics, and overlays. Digitization takes an overwhelming amount of communications, command and control and intelligence data which the shooters, deciders, and supporters face, stores it, processes it, and presents information in a format that facilitates rapid decision making. The architecture will incorporate the information requirements for each level of command. Information is "filtered" to provide the necessary and appropriate information for each level of command. Thus, the tank commander receives only the information he needs to conduct his mission, but a battalion commander will receive a greater amount of information commensurate with his responsibility. These information requirements are developed by users to minimize information overload and at the same time ensure the users at each level have the required information available to perform their battlefield functions. The April 1994 National Training Center Rotation 94–7 is the first scale experiment of the digitization concept. Evaluators from the Operational Test and Evaluation Command, the Armor Center, and National Training Center will assess the value added of the new information systems and assist in refining system requirements.

Question. The digitization concept is to be tested at the National Training Center later this month. What specifically is to be done during this demonstration and what is the goal?

Answer. The National Training Center exercise is not a test for the digitization concept. The goal of the exercise is to experiment with and demonstrate the warfighting capability of a Task Force using digitized technology to enhance lethality, tempo, and survivability across the combined arms team in a tactically competitive environment found at the National Training Center. Systems included in the experiment are the M1A2 Abrams, M2A2 Bradleys, M577 command post vehicles, M113 personnel carriers, AH–64A Apaches, UH–60 Black Hawks, OH–58D Kiowa Warriors, a prototype battle command vehicle, and individual soldiers. The exercise will also experiment with the software capabilities of the M1A2 Abrams, and Brigade and Below Command and Control software on the other platforms. Users, as well as evaluators from the Operational Test and Evaluation Command, the Armor Center, and the National Training Center, will assess the value added of the new information systems and assist in refining system requirements.

Question. The Army Tactical Command and Control System, an ongoing Army Research, Development, Test and Evaluation (RDT&E) program, seems very similar to the digitization effort. The budget justification indicates it is an "umbrella program to exploit automation technology in support of making sound and timely command and control decision . . . to achieve horizontal integration of . . . battlefield functional areas". How is the Army Tactical Command and Control System different from digitization?

Answer. Digitization is the application of technologies to acquire, exchange, and employ timely digital information throughout the battlespace, tailored to the needs of each decider, shooter, and supporter allowing each to maintain a clear and accurate vision of his battlespace necessary to support both planning and execution. The Army Tactical Command and Control System (ATCCS) is an integral and key part of the overall digitization effort. ATCCS is the digital command and control architecture at brigade level and through corps level for the Army. The digitization concept encompasses the integration of weapons platforms, command and control, and other information systems into a seamless digital architecture. ATTCS is a subset of the digitization effort.

Question. Why are both needed?

Answer. Digitization is the overall planning and integration effort, ATCCS is a subset of digitization and is one piece of the execution phase of digitization.

Question. The Army is using its fiscal year 1994 funds, in part, to study how the ATCCS can be integrated into digitization. What has the Army found so far?

Answer. Nothing yet, since the test is to be conducted in August and September of 1994. The test will evaluate the capabilities of the sub-elements of ATCCS and the horizontal interoperability with other systems.

Question. The Army budget contains a $19 million new start to integrate command and control information between the fire support team vehicle and the Bradley Fighting Vehicle. Isn't this premature given the overall planning for digitization has just started?

Answer. The Fire Support Team (FIST) Integration Project is not the integration of command and control information between the FIST vehicle and the Bradley Fighting Vehicle. The Project supports the conversion of Bradley Fighting Vehicles to the Bradley Fire Support Vehicle. This project will integrate a significant portion of the current FIST vehicle mission equipment to the Bradley Fighting Vehicle System. In addition to command and control hardware, the program includes a Laser Designator North Seeking Gyro, a Global Positioning System, FIST vehicle radios, and combat identification to increase the capabilities of the Bradley platform. This project is not premature, rather it is based on the fact that the current FIST vehicles, M981's, were as maneuverable or mobile as the Bradley/Abrams equipped maneuver forces during operation Desert Storm.

Question. To be really effective, wouldn't all the Services need to be involved in digitization in order to communicate on the battlefield? What efforts is the Army taking to ensure its equipment can communicate with other Services' equipment and with allies' equipment?

Answer. All Services are involved in information technologies to one degree or another. Various boards and committees at the Joint Chiefs of Staff (JCS) and Office of the Secretary of Defense (OSD) level coordinate the interfaces. At lower levels of command, platoon/company/squad, digitization can be extremely effective in providing situational awareness data and other operational information to the leaders and commanders. At higher levels of command, where interoperability with other services becomes imperative, the information made available through the Army's digitization is still available for transmission to other services. At the platform level the Air Force's warfighting platform is the aircraft; the Navy's is the ship. To varying degrees, these platforms are already digitized. The Army's warfighting platforms are the tank, the helicopter, the Bradley, the howitzer, and ultimately, the individual dismounted soldier. The digitization initiative is intended to provide a capability to digitally link these Army platforms and appropriate platforms of other Services. The Army is working closely with the Marines to assure ground forces can be effectively coordinated and synchronized. The Army is completing its internal staffing of the Mission Need Statement (MNS) for digitization which will then be provided to the Joint Staff or approval. The MNS is being prepared for submission to the Joint Requirements Oversight Council (JROC). During this process the Army will work with the Joint Staff and the other services to ensure joint integration. The Army has already conducted working group meetings with the Marine Corps Systems Command. Additionally, the Army is a member of the Joint Tactical Fusion Interoperability Steering Group. In terms of protocols and standards for communications, the Army is using Military Standard 188–220, which is evolving joint standard for its Combat Net Radio. As the Army works through the JROC process, compatibility issues involving other services will be resolved.

COMANCHE HELICOPTER

Question. How high a priority is Comanche for the Army?

Answer. Comanche is a number one modernization priority for the Army.

Question. Is the Comanche under funded in the Future Years Defense Program (FYDP).

Answer. The Comanche is not under funded in the FYDP. Funding for FY95–99 provided in the FY95 President's Budget meets the requirements of the streamline program.

	1995	1996	1997	1998	1999
Funding	525	374	499	523	660
Requirements	525	374	499	523	660

Question. To overcome this funding shortfall, the Army is considering a plan to streamline the acquisition process by jumping from the prototype program immediately into low rate production. Isn't a streamlined approach risky for a program this large and important?

Answer. The streamline approach does not provide for jumping from the prototype program immediately into low rate production; it calls for a number of event-based In Process Review (IPR) and continuous Army and Office of Secretary of Defense (OSD) involvement in the management of the program. The detailed definition of the streamline approach is the subject of the first IPR scheduled for May. This approach, which provides for testing of an Engineering Manufacturing Development (EMD) configuration earlier than the baseline two phase development approach, allows a reduction in the number of prototypes and eliminates duplicate flight testing. Since the overall flight test hours are not drastically reduced, and the streamline program increases the use of flight simulation, risk is not appreciably increased. The reduction in the number of prototypes does increase programmatic risk if a prototype is lost or damaged during flight test. Assets are available and the program schedule is flexible enough to allow for rapidly building an additional prototype aircraft should the need arise. The Army still considers the Comanche as its highest priority program, but is convinced that properly applying acquisition streamlining can result in development savings while retaining a program that will produce a helicopter that meets all the operational needs of the user.

Question. What are the anticipated savings that the Army expects to achieve through streamlining?

Answer. The Army expects to save approximately $550M due to the streamlining efforts. However, additional requirements have offset over $500M of this effort. The additional requirements are due to program extension, adjustments for CAIG estimates and enhanced or additional capabilities.

Question. Please explain how much of the above is actual savings and how much are deferrals?

Answer. The savings do not include deferrals. Deferrals actually result in an increase in total program requirements due to inflation and lost efficiency. Therefore there are zero deferral dollar savings in the above dollars.

Question. Is it true that the Army and the contractors do not have a plan for streamlining yet and are going to contract with a consultant to develop such a plan?

Answer. No, that is not true. The Army and contractors do have a plan and have been working diligently to bring this plan into fruition. The Joint Program Office (JPO) has a small effort for an independent third party to look at what has been accomplished to determine if there is anything in addition that should be considered that would enhance a more efficient development program.

Question. How much will this contract cost the Army and why can't it perform the work in house?

Answer. Independent in house reviews have been conducted and more are planned as the streamlining effort continues. The JPO has implemented (less than $150 thousand) an additional effort intended to get a fresh look by experienced individuals to determine if there are any policies that might be changed that would help in the acquisition streamline process.

Question. The Air Force indicates that problems with the C–17 and B–2 are the result of concurrency. The General Accounting Office (GAO) has reported on the problems concurrency caused with the development of the Apache attack helicopter. What lessons did the Army learn from these instances and how is the Comanche streamlining going to be better?

Answer. The Army has developed lessons learned from other programs. Each of these lessons learned have been applied towards Comanche development. Specifically, the following apply: (1) Training system developed concurrently with air vehicle and ready to support Initial Operational Capability (2) Design through use of Product Development Teams insures all areas are considered early in the design. Additionally, through an extensive Advanced Rotorcraft Technology Insertion Program and risk reduction program that started in 1985 with a number of firms (Bell, Boeing, IBM, McDonnell and Sikorsky) lessons learned from all Army helicopters were taken into consideration before the final Comanche design was selected. This included emphasis on supportability during source selection and concurrent development, insuring the design of a fully supportable weapon system.

Question. Will the streamlining of the Comanche program lead to concurrent testing?

Answer. The Army plans to conduct testing concurrent with the production of Low Rate Initial Production (LRIP) aircraft. The amount of concurrency increases somewhat during streamlining, some concurrency is necessary to allow the manufacture of LRIP "production representative" aircraft for the Initial Operational Test. This was an additional lesson learned from the Apache program.

Question. Streamlining would reduce the number of test helicopters by one-third. How much technical risk does this action cause and how much Research and Development (R&D) funding would it save?

Answer. Technical risk is not increased by reducing the number of prototypes in the development program. All developmental tests (surveys and demonstrations) and operational tests planned in the program (Demonstration/Validation followed by Engineering Manufacturing Development) will be conducted in the streamline program. In fact, total flight test hours have not been significantly reduced. In addition, the streamline program provides for increased use of flight simulation to reduce risk and greatly increase the efficiency of scheduled flight tests. The reduction of two prototypes should save approximately $90 million.

Question. Will the Office of the Secretary of Defense need to approve the streamlined approach for Comanche?

Answer. Yes, the Army and OSD have approved the concept in principle both verbally and in writing (Principal Deputy Under Secretary of Defense for Acquisition Memorandum of February 18, 1994). Further review and guidance will occur in the May 1994 IPR and final approval in 1995.

Question. We understand that the total cost including Research, Development, Test and Evaluation (RDT&E) and procurement costs of Comanche will be about $44 billion. About 1300 helicopters are to be procured, making each unit about $34 million. Why is the per unit cost so high?

Answer. The dollars quoted are escalated or then year dollars which increase in amount for time value of money and inflation. The basic cost of the Comanche program has not grown in constant dollar terms except for cost increases created by program pertubations beyond the Army's control. These program pertubations include costly restructures, quantity reductions (2096 to 1292), and program stretches. The fiscal year 1988 constant dollar estimate for Comanche flyaway is $10.5 million.

Question. Can the Army really afford such an expensive program?

Answer. Yes, the Army must afford Comanche. As the Chief of Staff of the Army has repeatedly stated, Comanche is the quarterback of the digitized battlefield of the future and the key to force modernization.

Question. The Army briefed the Committee in 1992 that the fiscal year (FY) 1995 request would be $326 million. However the request is actually $525 million. What caused the huge cost growth?

Answer. In 1992, the Comanche program was a Demonstration/Validation (DEM/VAL) only program with no funding for Engineering Manufacturing Development (EMD) or production. In early 1993, the Office of the Secretary of Defense added funding to the

Comanche program for DEM/VAL, EMD, and the beginning of production. The FY95 additions were specifically: to rephase the funding consistent with the contractor DEM/VAL proposals and to include some add-backs that had previously been deferred. The FY95 funding, then, was increased from $326 million to $472 million and the contracts were signed based on that funding level.

The FY94 President Budget reduced the FY94 request by $76 million to $367 million and the FY95 amount to $445 million. The FY94 reduction caused a shift in work from FY94 to FY95. The FY95 request has thus been increased by $80 million ($70 million for FY94 deferrals and $10 million for inflation and other minor adjustments) from $445 to $525 million.

Question. Both the General Accounting Office and Congressional Budget Office (CBO) have recently suggested terminating the Comanche program because its capabilities are so similar to the Apache and because it will be so expensive. CBO suggests buying additional OH–58Ds or Apaches instead. Please comment.

Answer. The Army aviation mission areas of Air Cavalry and attack in support of light forces are broken. The Air Cavalry (armed reconnaissance) mission is considered so important that units are dedicated to its performance. The Comanche is the least cost alternative that deals with these demonstrated and validated battlefield deficiencies in Army aviation. Terminating the program will result in increased (not reduced) budgetary requirements. All other alternatives for meeting the deficiencies are more expensive; that is, cancelling Comanche will cost the taxpayer more in the long run.

The recently completed Bottom Up Review (BUR) also validated that there is no blur in roles among the Army's helicopter fleet. Apache fulfills the Army aviation attack mission and is optimized for that purpose. It is an effective attack helicopter as demonstrated in Desert Storm and other recent conflicts. Planned improvements to the Apache fleet should assure its continued effectiveness well into the 21st century. However, the Apache is too detectable to perform as a scout which must "see and not be seen," and it cannot be sustained at the operational tempo of a scout aircraft. The Apache is also more expensive to purchase, operate, and maintain than Comanche.

The Kiowa Warrior is the interim solution to the armed reconnaissance mission deficiency. The battlefield commander needs an air reconnaissance capability until Comanche is fielded. The Kiowa Warrior is the best solution now, but it cannot fill the whole requirement. Its firepower is limited to four Hellfire missiles at sea level and its range is only 210 nautical miles. It has neither the low signature, range, or payload necessary to perform armed reconnaissance on the battlefield of the future.

Comanche fully fills the need for Army aviation armed reconnaissance on the battlefield of the future. Comanche will allow the commander a full view of the total battlefield never before possible. More United States one-sided victories in the future and reduced fratricide will be realized with the fielding of Comanche in the Air Cavalry mission. Additionally, Comanche because of its self deployability, short logistics tail, reliability, maintainability, and supportability is the ideal choice for the light attack (or attack in support of contingency forces) mission.

In summary, large investments for marginal improvements to the current fleet make no sense when the cost effective solution, Comanche, will fly this coming year (1995). The supposed short-term cost "savings" with the proposed approach will not save in the long run. We must invest in the future now, or pay in combat casualties, to include fratricide in the future.

Question. Documentation for the Bottom Up Review (BUR) indicates that the Research, Development, Test and Evaluation (RDTE) baseline for Comanche had been $6.6 billion, but was increased to $6.9 billion to reduce program risk. Why was $300 million added to the total cost?

Answer. The Comanche Program Management Office input to the BUR was $6.7B. The difference between $6.7 and the current requirement of $6.7B is approximately $200M. Of this, $50M was an increase for Sikorsky overhead resulting from termination of Black Hawk production. The remaining $150M was added to account for a one year longer program given a $500M/year RDTE funding constraint in the streamlining guidelines established by the Army. [This $150M includes inflation and more fixed costs such as in-house program management, support contracts and major contractor program management.] The $200M was not added to reduce program risk, rather to adjust program requirements to program realities).

Question. How does it help to reduce risk?

Answer. The risk reduction provided by the RDTE plus up allows development and test of items that had been deferred due to funding constraints.

Question. What is the risk?

Answer. The risk is that those deferred items would not work when needed.

Question. The Future Years Defense Program (FYDP) indicates that Comanche funding is to fall in FY96 to about $374 million and level out after that at about $500 million a year. Why does funding drop in FY96 relative to other years?

Answer. Part of the apparent disparity was caused by the shortfall in FY94. As explained earlier, a substantial amount of FY95 funds will be used to recover from the FY94 shortfall. Another reason for the 1996 downturn is a general problem with the funding level the Army has to work with in FY96.

Question. The Army has said that the Comanche will result in reduced operations and support (O&S) costs. The reduced costs are attributed to the Comanche's 2 level maintenance concept and its low 2.6 maintenance man hour per flight hour (MMH/FH) specification. Is the 2.6 MMH/FH specification for the Comanche still accurate?

Answer. Yes. The Comanche MMH/FH requirement is 2.6, recent analysis has shown that this level can effectively be reached.

Question. When will the Army be able to demonstrate this level of performance?

Answer. The goal of the Comanche supportability program is to demonstrate 2.6 MMH/FH at Initial Operational Capability.

Question. If the Comanche is unable to achieve this level of performance what will be the impact on the projected O&S costs?

Answer. Several maintainability demonstrations have been completed to insure that the 2.6 MMH/FH goal is achieved. However, if the Comanche exceeds that goal, those components not demonstrating predicted reliability will be redesigned and retrofitted very early in the program; therefore insuring that overall O&S costs would not increase.

Question. Another key to the Comanche's projected low operation and support (O&S) costs is the high percentage level of self diagnostic capability (95% fault detection and 98% fault isolation). What do these requirements mean?

Answer. Ninety-five percent fault detection means that for those sub-systems that utilize diagnostics, 95% of the time the built in tests will accurately detect the failure to the correct sub-system. Ninety-eight percent fault isolation means that those line replaceable units/modules of a particular sub-system will be isolated 98% of the time accurately. Ninety-five percent fault detection and 98% fault isolation allows fielding of the Comanche without external automatic test equipment.

Question. When will they be demonstrated?

Answer. During Initial Operational Testing. Demonstration of fault detection/isolation will be completed in fiscal year (FY) 2002, fielding will be started in FY03.

Question. What will be the impact on the projected O&S costs if the Comanche is unable to perform to these tests?

Answer. If the Comanche does not meet the diagnostics requirements, manual trouble shooting techniques will be utilized, which would increase trouble shooting time until an appropriate hardware/software change could be implemented.

Question. The critical design review took place at the end of last year, resulting in 37 identified problems. Does the Comanche face any major technological issues or are these problems relatively easy to fix?

Answer. The 36 (not 37) action items are a combination of questions and/or issues. This small number of action items for a major program design review is indicative of the program's success, rather than an indication of problems. None of the issues/questions raised were major technological concerns. In fact, the contractor has already responded satisfactorily to all items.

Question. An important design feature of the Comanche is its low observability. Will the use of the externally mounted weapons or fuel tanks needed for the Comanche in its various roles significantly reduce its low observability?

Answer. External stores will increase the signature of the aircraft, however, again this is situationally dependent and the commander will assess all factors in determining the exact mission configuration. The External Fuel and Armament System is being designed to be consistent with the overall signature reduction concept of the Comanche.

Question. Does the Comanche have aircraft survivability equipment (jammers) to use in the event it is not low observable?

Answer. Testing that has been completed indicates that Comanche will be capable of defeating the current projected threat. Should the threat change, the Comanche is designed to accept active aircraft survivability equipment, which is being developed through a separate program.

ADVANCED FIELD ARTILLERY SYSTEM (AFAS) AND FUTURE ARMORED RESUPPLY VEHICLE (FARV)

Question. The Advanced Field Artillery System (AFAS) is the Army's next generation 155mm self-propelled howitzer system. The Future Armored Resupply Vehicle (FARV) will resupply the AFAS with ammunition and fuel and be more survivable and faster than the current resupply vehicle. The fiscal year (FY) 1995 budget request is $175 million. We understand that the Army plans to downselect to one contractor *before* the demonstration phase. Why is the Army considering this?

Answer. The original baseline acquisition strategy for the AFAS/FARV was to competitively select a single prime contractor for the Demonstration and Validation Phase (Dem/Val) to develop the AFAS and FARV system and develop operating prototypes for test and evaluation. That Dem/Val contractor would continue through the Engineering and Manufacturing Development (EMD) and Low Rate Initial Production (LRIP) Phases. Teledyne Continental Motors (TCM), and United Defense (UD) (formally FMC and BMY) has been expected to submit bids.

During recent discussions with prospective contractors regarding the strategy, several contractors recommended the Army explore a strategy that would more fully capitalize on the significant investments made in the Armored Systems Modernization (ASM) program, while maintaining the industrial base.

United Defense, TCM, GDLS and Martin Marietta Defense Systems (MMDS) (formerly General Electric) were requested to meet to give the contractors an opportunity to develop their concept of a strategy that accomplishes the above goals and remains responsive to the requirements of the AFAS/FARV.

The prospect of real competition appears remote. TCM, GDLS, and UD each suggested a strategy whereby the Army would permit contractors, which have performed AFAS related work under Army contracts, to team and submit a noncompetitive bid. The team would be under the control of a prime integrator approved by the Army. This alternative strategy would exploit prior investments in the Regenerative Liquid Propellant Gun (RLPG), Advanced Technology Demonstrator chassis, and the heavy combat vehicle industrial base by combining the contractors into one primary sub-contractor team. This strategy could accelerate the program, build on previous investments in the AFAS, and serve to better preserve our heavy combat vehicle industrial base.

Informal talks with representatives of the Department of Justice have established that they would not object to this arrangement. Their position was derived from the Army conclusion that real competition is remote and that the Army authorizes the teaming discussions in advance.

The Army Acquisition Executive for Research, Development and Acquisition, has met with the Under Secretary of Defense for Acquisition and Technology, and his staff and advised that the Army would like to explore the alternative strategy. The Office of the

Secretary of Defense has not yet informed the Army of its final decision.

Question. What happens if the contractor selected for demonstration does not produce?

Answer. The Army's acquisition strategy for the procurement of the AFAS/FARV Phase I and II is to allow the four major combat vehicle industrial base producers to participate in the development of the system. In doing so, the Army will assure the maintenance of the capabilities, expertise and facilities that would be put at risk or lost if only one contractor was selected for the award. The strategy allows for industry to share among themselves all knowledge previously gained from government contracts pertaining to AFAS/FARV while eliminating the possibility of substantial duplication of cost and attendant program delays if only one contractor was selected to participate in the development. In the unlikely event that the selected prime contractor does not produce, another participant of the industry team would have gained sufficient knowledge and experience to assume to role as the prime contractor. To insure multiple options for execution of this program, the Army will procure a production technical data package for the possibility of competitive procurement during the Production and Deployment phase.

Question. If this is such an important program, why will the demonstration phase last six years?

Answer. In the spirit of streamlining and acquisition reform, the Army recently approved a strategy for the development of AFAS and FARV that reduces overall development time, achieves First Unit Equipped (FUE) earlier, takes advantage of better engineering practices, and maximize the use of simulation and modeling. The Army envisions the development cycle to consist of three phases, the first two of which are solicited with the Dem/Val Request For Proposal.

The Simulation and Component Maturation phase (Phase I) is a 26 month design requirements development and validation effort with the objective of synthesizing the AFAS and FARV operational requirements into design requirements for the Field Artillery System.

The Prototype Fabrication and Demonstration phase (Phase II) is a 34 month subsystem and prototype integration and initial User assessment effort with the objective of validating that the Operational Requirements can be achieved through critical subsystem and limited prototype development and User testing.

Phase III, Full System Development and Pre-Production is a 36 month development effort with the objective of validating the system through Government technical and operational evaluation of full-up prototypes and establishing a pilot manufacturing line in preparation for LRIP.

Question. When will the first unit be fielded?

Answer. Under the Army approved streamlined acquisition strategy, the FUE is anticipated to be 12–15 months earlier than the previously planned fourth quarter FY 06.

Question. The Committee understands that the Army is allowing the company that developed the liquid propellant gun to team with one of the two main potential contractors. The liquid propellant gun is the main improvement on AFAS. Is this still the plan or will liquid propellant gun technology be made available to all contractors equally?

Answer. The Army executed a license agreement in 1984 with General Electric (now MMDS) which provides the government with rights to RLPG technology. Under the terms of this agreement, the United States Government (USG) has the right to use data developed by the contractor even if such data is developed at the contractor's private expense. The rights to this data includes the right to provide proprietary technical data to third parties for purposes of conducting competitive procurement, both for research and development, as well as eventual production. This license agreement provides sufficient rights in the RLPG technology to allow the USG to pursue the competitive development of the RLPG.

The RLPG is an integral part of the total AFAS system from a number of perspectives: technical and tactical fire control; propellant storage; pumping and management; automatic ammunition handling; power consumption and distribution; mobility platform stabilization; energy distribution; vehicle configuration and structure; computation demands; etc. In recognition of MMDS unique position as the only known source for RLPG technology, the government negotiated, as part of its current RLPG contract with MMDS, a contractual clause which precludes them from entering into any exclusive agreement with any other contractor for the RLPG technologies developed under contract with the Army. To ensure that this knowledge and technology is made available, MMDS will be made available to any and all offerors for the RLPG primary armament subsystem. MMDS has agreed that they will not compete as a prime contractor for the AFAS, nor will they enter into any exclusive agreement with any offeror(s) relating to the RLPG. A previous exclusive agreement has been abrogated.

Question. The Army plans for each AFAS to have its own resupply vehicle. What is the current ratio of self-propelled howitzers to resupply vehicles?

Answer. The AFAS and FARV are considered as an inseparable system of systems, required to service the field artillery needs in the close and deep battle. Therefore, each AFAS will require a FARV resupply vehicle on a one-to-one basis to support the supply needs of the AFAS.

Question. Why is it necessary for each AFAS to have a resupply vehicle?

Answer. The Army's concept of employment of the AFAS requires a resupply vehicle for each AFAS. The AFAS has the capability to carry 60 rounds. With the expected AFAS rate of fire, these rounds will be expended in a relatively short period of time. FARV, the companion ammunition resupply vehicle to AFAS, will have a rearming capacity between 130 and 200 rounds, and will be capable of automated rearming and refueling operations. This resupply capability is required to allow the AFAS to operate in extended operations, and perform its expected mission.

JAVELIN WEAPON SYSTEM

Question. Javelin is a portable, medium-range antitank weapon system to replace the Dragon. It is to be procured by both the Army and the Marine Corps. The Army plans to award a contract for low rate initial production in May 1994 for 55 launch units and 750 missiles. The fiscal year 1995 RDT&E budget request is $31 million. The GAO reports that the total cost of Javelin will be $4.2 billion, $300 million more than the June 1989 development estimate, but for 40 percent fewer reusable launch units and 52 percent fewer missiles. In addition, the Secretary of the Army just reported a 72 percent unit cost increase in the last year. Why is Javelin experiencing such extreme cost growth?

Answer. The majority of Javelin procurement cost growth is attributed to program stretch-out and quantity reduction. In 1989, the Army's procurement objective was 58,000 missiles and 5000 Command Launch Units (CLU), procured over six years. The Marine Corps was also procuring 12,000 missiles and 917 CLUs in the same six years. Because of force structure reductions and budgetary constraints, the fiscal year 1995 budget is based on a stretched eleven year procurement phase, with a reduced procurement objective of 26,600 missiles, and 2,800 CLUs. The Marine Corps is further reducing missile quantities to 4,669, and CLUs to 336. In addition, budget justification material shows that Department of Defense induced budgetary constraints forced the Army to cut Javelin's funding level each year in fiscal years 1995–1999, a total in excess of $800 million. The program stretch-out, reduced quantities and budget cuts, coupled with higher prime and subcontractor hardware quotes, higher burden rates due to the declining defense business base, and the addition of Interim Contractor Support, have all contributed to increasing the procurement costs.

Question. What is the Army going to do about it?

Answer. The Army put on contract in March 1994 an Enhanced Producibility Program estimated to save $123 million in procurement. The Army is also second sourcing several key components, foremost of which is the focal plane array tactical dewar assembly. The Army is evaluating the potential for soliciting competitive proposals in Full Rate Production, and considering multiyear contracts as another means to control costs.

Question. What is the current launch unit and missile cost for low rate initial production and for full production?

Answer. The average procurement unit cost for the eleven year procurement program as shown in the fiscal year 1995 budget, including the recent Marine Corps quantity reductions, is $101 thousand for the round and $265 thousand for the CLU.

Question. Is this program still affordable for the Army?

Answer. The Army is committed to the Javelin system. No other antitank weapon in the world today provides the gunner with a manportable, fire-and-forget, top attack system that greatly increases his survivability due to the greater range, increased lethality, and soft launch capability. The Army owes the Javelin system to its early entry and dismounted forces, as the Dragon no longer holds the soldier's confidence.

Question. Last year the Armed Services Committees tasked the Army with a reassessment of cost effectiveness in view of escalating costs. Is the Army working on this? When will it be complete?

Answer. The House Armed Services Committee directed the Army to identify cost drivers and actions necessary to reduce round costs. The Army will submit its report by mid-May 1994.

Question. Last year, the Congress provided additional funds for an enhanced producibility project to reduce per unit costs on the Javelin. A contract for the effort was just let last month. What will be done under this contract?

Answer. Seven producibility enhancements associated with the missile will be designed, fabricated, assembled, and then subjected to design verification tests and system qualification testing.

Question. What per unit cost decrease will be realized?

Answer. A savings of approximately $3.7 thousand per missile.

Question. When will the cost savings be realized?

Answer. It is anticipated that the enhancements will be phased in during the second low rate initial production buy.

Question. What were the results of operational tests? From these and other tests, provide an assessment of Javelin's performance in countermeasures and realistic battlefield environments, such as smoke, fires and high clutter.

Answer. The Javelin Initial Operational Test and Evaluation (IOTE) was very successful. Javelin demonstrated considerable improvement over Dragon, i.e., over two and one half times the probability of kill and the mission success rate, and greatly improved survivability over that of Dragon. The primary shortcoming identified was durability of the Field Tactical Trainer (FTT). An upgrade has been developed to fix the FTT problems. A follow-on test will be planned to verify both the FTT fixes and some reliability improvements to the CLU. Overall, the conclusions from IOTE are that Javelin is operationally effective and significantly improves the capability of light infantry to defeat modern armor.

With regard to the other tests, early in the Engineering and Manufacturing Development (EMD) phase, Javelin underwent a Baseline Test (BLT) involving target acquisition in a realistic operational environment with obscurants, to include white phosphorous, bi-spectral smoke, and fog oil. Acquisition exercises were also conducted against tank targets covered by foliage. The tests were run using the Dragon and the Tube launched, Optically sighted, Wire guided (TOW) thermal sights for baseline comparison. Results of the BLT showed that Javelin significantly outperformed Dragon and was very close to TOW within a range of 2000 meters.

As EMD progressed, the Javelin system was subjected to non-firing countermeasure tests and Dirty Battlefield tests. In addition, 43 flights were conducted in various countermeasure environments, of which 39 were direct hits. Of the four misses, only one was attributed to the effect of the deployed countermeasures.

Javelin performance can be degraded in the presence of fires if certain conditions occur. This effect has been quantified and has been judged to be a rate operational occurrence. However, the training program will be enhanced to present the gunner with the specific condition and the techniques to avoid or work around the condition.

Performance in smoke is a function of the type of smoke, the amount deployed, its thickness, and wind direction and speed. Javelin slightly exceeds the requirement in smoke conditions as specified in the Joint System Operational Requirement. However, all infrared (IR) systems, not just Javelin, experience similar degradation in smoke environments, especially if the smoke is very thick.

The training program will allow the gunner to be trained in those conditions and thereby increase Javelin's ability to perform in those cases where the battlefield smoke exceeds the defined operational requirements. High clutter environments are a problem for all IR systems. Javelin performance is degraded at long ranges in high clutter conditions. The effect is range dependent and the training program will further mitigate the effects of high clutter on system performance.

Question. Why is Javelin not required to identify friend from foe? How will this impact the troops' use of the system?

Answer. At the time of Javelin's inception, Identify Friend from Foe (IFF) was not considered a critical operational requirement for a manportable, antitank weapon system. Although Javelin does not possess an electronic IFF capability, it does have an inherent IFF capability, albeit limited but much improved over Dragon. The infrared optics enable the gunner to recognize and, to a certain extent, identify targets at extended ranges out to 2,000 meters. The degree of accuracy with which the gunner identifies these targets as friend or foe is dependent upon weather, target range, battlefield conditions, and gunner training. In addition, the Army's Battlefield Combat Identification System (BCIS) program will include Javelin in the IFF modernization plan.

Question. The Army and contractor say the only real technical problems are with the training unit. What are the problems and will they be corrected before low rate initial production?

Answer. The majority of the problems require durability and reliability upgrades. Several performance upgrades will allow the FFT to better replicate the tactical system. All upgrades will be incorporated prior to low rate production deliveries.

ENHANCED FIBER OPTIC GUIDED MISSILE (EFOG–M)

Question. Enhanced Fiber Optic Guided Missile (EFOG–M) would provide a new, indirect fire, early entry capability for the Army. It would be shot from a high mobility multipurpose wheeled vehicle (HMMWV) and guided to the target through a cable that is attached from the HMMWV to the missile. Its targets are armored combat vehicles and helicopters. The budget request is $61 million. Office of the Secretary for Defense is initiating this new EFOG–M demonstration. How committed is the Army to EFOG–M—or is the driving force really OSD?

Answer. The Army supports the austere EFOG–M program since it is limited in scope, risk, and cost. The Army support for the Rapid Force Projection Initiative/EFOG–M Advanced Concept Technology Demonstration (ACTD) is evidenced by devoting manpower, planning, specialized expertise and other resources under the Army's Total Obligation Authority increase by OSD. The program is designed to permit the Training and Doctrine Command to thoroughly explore high priority issues associated with the use of non-line of sight weapons by our early entry forces.

Question. Describe the structure of the EFOG–M demonstration. What is to be accomplished at each phase and how much will have been invested at each phase?

Answer. The EFOG–M Advanced Concept Technology Demonstration Program consists of the virtual prototype demonstration phase; the ACTD and integrated demonstration phase; and a post demonstration user evaluation phase. The details and cost by phase include:

1. Virtual prototype demonstration phase is estimated at $73.9 million. This phase consists of development of a baseline concept of tactics, techniques, and procedures (TTP); fabrication and assembly of hardware for two stationary and four mobile simulators; fabrication of a missile simulator (seeker and data link on an aircraft for real time captive flight tests and evaluation); maturation of the TTP and employment concept; and the design of the fire unit and missile hardware.

2. The ACTD Phase is estimated at $205.7 million. This phase consists of missile and fire unit fabrication and includes proof-of-concept missile firings. Use of the surrogate missile, virtual prototypes, and Distributed Interactive Simulations to train troops for a large scale field demonstration is included as is demonstrating system capability against a free-play Opposing Force with connectivity to forward sensors used to find the targets for the missile. This phase determines system worth either for entering engineering, manufacturing, and development (EMD), or for follow-on evaluation and possibly limited production.

3. The post demonstration user evaluation phase is estimated at $10.3 million. This phase includes delivering a full company set of hardware (fire units, missiles, and platoon leader vehicles) and supporting that equipment for two years.

Question. The total demonstration program will cost $279 million and result in deployment of 12 fire units and about 250 missiles at the end of fiscal year (FY) 1999. What capability does this provide the Army? What do you envision in terms of cost and quantity for full deployment?

Answer. The Enhanced Fiber Optic Guided Missile (EFOG–M) Advanced Concept Technology Demonstration (ACTD) provides the Army a deployable brigade support package (1 company set) of fiber optic guided missile capability beginning in FY99. This company set could support a first-to-fight early entry brigade and provide a more survivable anti-tank capability than is currently fielded with our light early entry forces. The capabilities provided include:

1. An anti-tank/anti-helicopter weapon capable of precision fires up to 15 kilometers in adverse weather, day or night, that will limit collateral damage and fratricide by employing a man-in-the-loop.

2. EFOG–M mounts on a heavy variant of the high mobility multi-purpose wheeled vehicle, has a two-man crew, and is designed to deploy with early entry forces.

3. Interfacing with the standard Army command and control system for target information to support a deployed division ready brigade. No deployment decision beyond the ACTD has yet been made. One fundamental feature of an ACTD is that it defers major production and deployment investment until the Army is certain of the system's value and has worked out all the system of system procedural and integration issues. One option could be to field EFOG–M to the light early entry forces. The quantities for this op-

tion include 120 fire units and 2880 missiles at an estimated cost of $1.25 billion.

Question. What is the reason for the huge cost growth in the previous iteration of this technology (non-line of sight, which was cancelled by the Army last year because of cost growth making the program $3 billion in total)?

Answer. The previous iteration of this technology was a full scale development (FSD) effort with a technically challenging range requirement and all the standard FSD programmatic and contract restrictions. At the outset of that effort the contractor proposed an unrealistic, and what proved to be, an unachievable cost target. Additionally, during the course of the effort the contractor progressed at a slower and more costly rate than planned, driving the resulting contract cost to unacceptable levels.

Question. How does the Army plan to avoid similar cost growth in the Enhanced Fiber Optic Guided Missile (EFOG–M) program?

Answer. By contrast, the current plans for the EFOG–M program involve a much more modest range requirement that permits a much simpler rocket motor. Since the program is now Science and Technology, as opposed to full scale development, the technical and contracting approach includes streamlined programmatics, minimal government specifications and standards, best commercial practices accepted, and integrated product and process development, and smaller government and industry management offices. Upon successful demonstration of the EFOG–M, the Army will then assess fielding options, that is, the choice may be to proliferate the missile system throughout the Army. At that time, the Army can tailor the acquisition program and cost controls and incentives thereby avoiding the unacceptable cost growth of the past.

BRILLIANT ANTI-ARMOR SUBMUNITION (BAT)

Question. Brilliant Anti-armor Submunition (BAT) is an unpowered submunition designed to provide precision attack of moving armored targets at extended ranges. BAT submunitions are to be delivered to a target area and dispensed from a carrier missile. The BAT pre-planned product improvement (P31) program would improve the submunition's sensor and warhead so that it could detect cold, stationary targets as well. The fiscal year (FY) 1995 budget request is for $109 million. What is the current schedule and major milestones for the BAT and BAT P31 programs? How does this year's schedule compare to last year's schedule?

Answer. BAT is currently in its 35th month of a 79 month engineering and manufacturing development (EMD) program. The major events and milestones of the current BAT schedule are as follows: Design Verification Tests (DVT) flights will be conducted through the end of FY94; Phase I of Contractor Development Tests (CDT) flights will be conducted March through August 1995; Phase II of CDT flights from January 1996 through March 1997; EMD will end on December 31, 1997; the decision to start Low Rate Initial Production (LRIP) by the Conventional Systems Committee (CSC) will be made in December 1997; LRIP I contract awarded in January 1998; LRIP II contract will be awarded in March 1999; and Milestone III—production in March 2000.

BAT's schedule was extended two years to better align the development and integration of the submunition with its new carrier (Army Tactical Missile System—ATACMS). When the Tri-Service Standoff Attack Missile (TSSAM) was the primary carrier for BAT, EMD for BAT was planned to be 54 months long. LRIP I contract was to be awarded in November 1995. All DVT and CDT flights were to be completed by September 1995. Finally, Milestone III was scheduled for November 1998.

The BAT P31 program schedule has not been affected by the change in the carriers for BAT. It is in the seventh month of a ten month Phase I (studies) of a 51 month Demonstration and Validation (DEM/VAL) program to determine which seeker technologies to take into Phase II. The Chairman, CSC, will review the program in July 1994 prior to the award of the contract for the 41 month Phase II of DEM/VAL in which a seeker technology will be selected to enter EMD. The EMD for BAT P31 will begin in January 1998. A LRIP contract will be awarded in April 2001, with Milestone III scheduled for February 2002.

Question. Brilliant Anti-Armor Submunition (BAT) will be dispensed from a different missile than originally planned, Army Tactical Missile System (ATACMS) rather than from the Tri-Service Standoff Attack Missile (TSSAM), since the Army has terminated its participation in TSSAM. What changes to the BAT and ATACMS programs are caused by this realignment? Will the changes impact cost or effectiveness? (The budget submission indicates a two year delay in the BAT program and a $10 million increase in the ATACMS program).

Answer. The BAT program has delayed Low Rate Initial Production (LRIP) start from fiscal year (FY) 1996 (with the award of the long lead items contract of FY95) to FY98. The primary reason for this delay is to allow for the development of the ATACMS Block II carrier and optimization of the BAT submunition for dispense and subsequent deployment. The Army has reprogrammed $3.99 million in FY94 funds to initiate BAT/ATACMS carrier integration risk reduction activities and to conduct initial design efforts to support preparation for the ATACMS Block II Milestone IV decision review in March 1995. In FY95, $10.1 million has been budgeted for the initiation of the EMD program for ATACMS Block II. Activities in EMD will include fabrication and testing of the ATACMS Block dispenser and restraint system.

There is no change to the BAT's effectiveness requirements due to the realignment to ATACMS. The Operational Requirements Document for BAT includes system performance requirements for the dispense of BAT submunitions from ATACMS and TSSAM. The fraction of kills per submunition remains the same for either carrier given successful dispense.

Question. How reliable an estimate is the $10 million for this realignment?

Answer. The BAT FY95 budget request was increased by $10 million by the Department of Defense to support the realignment activities. These activities include completion of the design and development of the submunition high speed stabilizer and testing. The Army is confident that the combination of both BAT and

ATACMS FY95 budget increases will support the realignment of these two programs.

Question. What testing does the Army plan for Brilliant Antiarmor Submunition (BAT)/Army Tactical Missile System (ATACMS) integration before beginning BAT's Low Rate Initial Production (LRIP) and what test results are required before granting approval for such production? Does the planned testing include demonstrations that BAT can survive dispense from ATACMS, find individual targets, and destroy them?

Answer. Prior to the initial LRIP contract award for BAT, the Army will conduct five BAT/ATACMS system flight tests as part of the ATACMS Block II Pre-Production Test (PPT) program. All of these tests will demonstrate that the BAT will survive dispense from ATACMS. The missiles that will be used in this series of tests will have mixed payloads—some submunitions will be tactical (with flight data recorders in place of warheads) and instrumented submunitions. In total, 11 tactical submunitions will be dispensed and flown against a representative target array to include eight T–72 tanks, four armored personnel carriers (BMP), three howitzers (2S1) and six foreign trucks. To prove target destruction after submunition impact, the following tests will be conducted: four warhead sled tests in late fiscal year (FY) 1994; at least six submunition flight tests which will drop six live tactical submunitions against the target array; and two live fire tests during the engineering and manufacturing development (EMD) phase prior to LRIP I contract award.

The BAT EMD program detailed exit criteria is defined in its Milestone II Acquisition Decision Memorandum (ADM) for long lead items and LRIP contract award. The exit criteria for long lead items contract award approval requires proof that the BAT can be dispensed from the carrier with no fraticide. This requirement will be addressed and achieved through the BAT/ATACMS system PPT tests prior to the initial LRIP contract award.

Additionally, specific performance criteria (e.g., kills per launcher load, warhead penetration, countermeasures hardness, etc.), reliability and unit cost exit criteria that must be met prior to LRIP contract award are defined in the ADM. BAT will meet these criteria through the results from the previously described tests, and from the results from the least 18 submunition flight tests using tactical submunitions (with flight data recorders) and accredited performance simulation.

Question. How does the Army plan to use the $10 million in fiscal year (FY) 1994 funding provided for the initiation of studies and design work for the integration of Brilliant Antiarmor Submunition (BAT) with the Multiple Launch Rocket System (MLRS) rocket?

Answer. Ten million dollars was appropriated but not authorized in the FY94 budget for BAT/MLRS integration studies. However, at the time there was not a firm requirement for providing a precision anti-armor attack capability to the division commander. Therefore, the Army gave up this $10 million on an omnibus action to pay high priority Operations and Maintenance Appropriations bills. Currently, the Army is finalizing an Operational Requirements Document (ORD) for a Division Precision Attack Capability. In support of this ORD requirement, the Army could utilize $10 million in addition to the FY95 budget request for BAT to proceed with an eighteen month program that will encompass design and trade-off studies and culminate in a flight demonstration of a BAT dispensed from the MLRS rocket.

TANK UPGRADE PROGRAM

Question. The Abrams tank is being upgraded to allow inter-vehicular communications, improved position and navigation information, and quicker target acquisition. The Abrams upgrade will provide a total of 1,079 M1A2 tanks (19 prototypes, 62 new production, and 998 M1 to M1A2 upgrades). The budget request is for $11.8 million. Total Research, Development, Test and Evaluation (RDT&E) costs for the upgrade increased from $534 million to $602 million since last year. What caused the increase?

Answer. In fiscal year 1989 (FY89) constant dollars, the program increased from $534 million to $602 million. In escalated dollars, this equates to an increase from $556.4 million to $640.6 million (a total increase of $84.2 million). A detailed breakout of the increase is shown below:

	Millions
FY94 Congressional plus up to complete M1A2 development and initiate electronics upgrade	$27.4
2nd Generation Forward Looking Infrared (2nd GEN FLIR)	44.6
FY93 Reprogramming	5.4
Miscellaneous Adjustments FY88–92	6.8
Total	84.2

Question. The $602 million is as of December 1993. What is the current total RDT&E cost estimate for the upgrade?

Answer. The $602 million is in FY89 constant dollars. The escalated equivalent is $640.6 million. This funding includes completion of M1A2 development ($576 million), initiation of an upgrade to the M1A2 electronics ($20 million), and integration of a 2nd GEN FLIR capability into the M1A2 ($44.6 million). The current estimate for M1A2 development is:

[In millions of dollars—escalated]

	As of December 1993	Current estimate
Completion of M1A2 through Type Classification	$576.0	$576.0
Electronics Upgrade	20.0	47.0
2nd GEN FLIR Upgrade	44.6	70.3
Total	640.6	693.3

Question. In addition, the total unit cost per tank upgrade increased in the last year by $1 million. This is because of increases in total funding for digitization of the battlefield, 2nd GEN FLIR, and initial spares and training devices. How will these items improve the tank's performance?

Answer. The total unit cost increase was due to changes in the business base assumptions for Phase II, digitization, 2nd GEN FLIR, and fixes to training devices and spares.

FY95 funding in the Abrams upgrade program does not include any funding for electronics improvements. PE23758 contains the funds to continue the improved electronics development and testing, initiated by Congress in FY94. Of the $75 million shown in this PE, $18 million is M1A2 electronics improvements. The FY96–99 digitization funding added to the upgrade program, $258 million in procurement, is for appliqué digital systems to enhance the capability of Army weapons systems to include earlier versions of the Abrams tank. We are working to fix the remainder of the electronics improvement program in the next budget submit.

In general, digital capabilities, such as the M1A2's Intervehicular Information System or the proposed applique system, will improve command and control, increase situational awareness and reduce the potential for fratricide.

Second GEN FLIR will improve the range of the Gunner's Primary Sight and Commander's Independent Thermal Viewer. This will enable the tank commander and gunner to recognize and identify targets at greater ranges, increasing performance and reducing fratricide potential.

Initial spares and training devices provide necessary logistics support and crew training for fielded tanks.

Question. What is the impact of these additions on the schedule for the tank upgrade?

Answer. These changes will not affect the upgrade schedule. The Milestone III production decision for the M1A2 tank was held, as scheduled, on April 8, 1994. The target date for award of the production contract is the end of May 1994. We will upgrade M1 tanks to the current M1A2 configuration. The Army plans to initiate improved electronics procurements in FY96 (production cut-in—FY97) and to begin 2nd GEN FLIR long lead procurements in FY97 (production cut-in—FY99). M1A2 tanks produced before 2nd GEN FLIR and electronics improvements are cut-in, will receive retrofit kits.

Question. Will the digitization portion of the upgrade allow Abrams to communicate with Bradleys?

Answer. The M1A2 talks to similarly equipped Bradleys today. The electronics upgrade will provide processor and memory improvements that will enable the M1A2 to accommodate Military Standard 188–220 protocols, variable message formats, and restores growth required to maintain pace with the Army's digitization efforts. As a result, the M1A2 will communicate digitally with other Army systems that host these protocols.

Question. The Congressional Budget Office has recommended canceling the M1A2 upgrade program because it is a relatively expensive means of preserving the tank industrial base and would upgrade the total capability of the entire Abrams force by only three percent. Please comment.

Answer. We believe that the M1A2 upgrade program is cost and operationally effective. The Abrams upgrade provides older M1 tanks with increased firepower, a Commander's Independent Thermal Viewer, a Nuclear, Biological, Chemical protection system, a position navigation system, and an integrated digital command and control system. These improvements have been tested in depth and provide the necessary increase in vehicle effectiveness to warrant support by the Army in our modernization plans. The combined effect of a force equipped with M1A2s and M2A3 Bradley Fighting Vehicles is needed to modernize the force to maintain overmatching capabilities for the foreseeable future.

Question. Will upgraded Abrams participate in the digitization demonstration later this month at the National Training Center (NTC)? Could it result in more changes to the Abrams upgrade?

Answer. The M1A2 tanks are the centerpiece of the digital command and control capability being demonstrated at the NTC. As we learn more about battlefield digitization, we envision additional hardware and software changes to not only the Abrams tank, but to other digitized platforms.

BRADLEY FIGHTING VEHICLE (BFV) UPGRADE

Question. The Bradley upgrade will provide improved electronics, command and control compatible with the Abrams tank, and improved second generation Forward Looking Infrared (FLIR). The budget request is $76 million. Last year you provided for the record that total Research, Development, Test and Evaluation (RDT&E) costs for the Bradley upgrade would be $366 million. A December 1993 report indicates $394 million. What is the current estimate?

Answer. The current RDT&E estimate for the Bradley A3 upgrade program is $439 million.

[Fiscal year—in millions of dollars]

FY94	63.5
FY95	76.1
FY96	110.6
FY97	83.7
FY98	64.3
FY99	40.8
Total	439.0

Question. Why are RDT&E costs increasing for the Bradley upgrade?

Answer. The RDT&E cost deltas are a result of changes to the Bradley A3's First Unit Equipped (FUE) date. The initial $366 million program estimate, prior to validation by the Army Cost Review Board, was based on an FUE of FY99. The $394 million estimate reported in the December 1993 Selected Acquisition Report is in FY94 base year dollars. The comparable "then year" cost would be $425 million, which represents the Army Cost Position (ACP) for an FUE of FY98. While an FY98 FUE has been the Army's goal, we recently determined that resources are not available to support fielding this early. Consequently, we decided to fund the program to a level which would achieve an FUE of FY00. The current cost estimate of $439 million reflects the ACP adjusted for inflation and the funding required to resource operational testing. Following is a recap of the cost estimates for comparative purposes:

Then year $—assumed FUE—source: $366 million—FUE FY99—Initial program office estimate; $425 million—FUE FY98—Army Cost Position, January 1994; and $439 million—FUE FY00—Army Cost Position, adjusted by most recent inflation indices, with operational test costs added, and reduced risk.

Question. What is the schedule and the major milestones for this new upgrade program?

Answer. The schedule and major milestones for the Bradley A3 upgrade program are as follows:

Milestone—Event:

January 1994—Army Systems Acquisition Review Council approval.

May 1994—Award Engineering and Manufacturing Development contract.

May 1994–July 1999—Engineering and Manufacturing Development.

August 1998—Begin Live Fire Test and Evaluation.

March 1999—Initial Operational Test and Evaluation.

November 1999—Milestone III.

January 2000—Award production contract.

April 2000—First Unit Equipped.

Question. Are you satisfied with the pace of this upgrade compared to the Abrams upgrade?

Answer. The Bradley A3 upgrade program began well after the Abrams (M1A2) upgrade program. Even so, we have made progress in the Bradley A3 upgrade program to reduce the gap between fielding the Abrams M1A2 and the Bradley A3 vehicles. Even with unconstrained funding levels, we would not be able to achieve concurrent Abrams M1A2 and Bradley M2A3 fielding.

This is due to the time required to complete the developmental efforts for the Bradley A3. Given the requirement to complete the Bradley's development, our goal has been to field Bradley A3's to the first unit in FY98. This goal was based on the availability of resources. As we progressed through the development of the Army's program for FY96–01, we have not identified the funds to achieve an FY98 FUE. Accordingly, the Army intends to resource the program to achieve FUE in FY00. This means there will be a four year gap between the fielding of the first Abrams M1A2 and the first Bradley M2/3A3. This is not the optimal strategy from a warfighting perspective, but it reflects the best we can achieve given fiscal realities.

Question. What parts of the Bradley upgrade program make the Bradley more interoperable with the Abrams M1A2 tank?

Answer. The most significant improvement is the introduction of a digital capability to allow the Bradley and the Abrams to communicate and pass digital information that will provide increased situational awareness and improved command and control. The introduction of a second generation FLIR detector will provide improved acquisition and target engagement. The Commander's Independent Viewer will give the Bradley improved acquisition and will enhance the combined arms operation with the Abrams tank by improving the lethality of the Bradley Fighting Vehicle. Survivability improvements, such as integration of Battlefield Combat Identification System and improved roof fragmentation protection, will increase the interoperability of the Bradley and the Abrams.

Question. How does the Army intend to monitor competition at the subcontractor level for the intervehicular communication portion of the upgrade? (After a long struggle with General Dynamics, United Defense won the Bradley upgrade contract. Now General Dynamics wants fair consideration as a subcontractor. The Army said they'd see to it.)

Answer. Although United Defense Limited Partnership (UDLP) has been designated as the prime contractor and systems integrator of the digitized electronics, it is the Army's intent to ensure that a level playing field exists to allow all interested vendors to compete for the components to be subcontracted. This will be accomplished in the following manner. First, through a contractual requirement the government will have the opportunity to review, comment on, and concur with subsystem specifications, subcontractor selection criteria, and subcontractor criteria weights. Next, the government will have the opportunity to observe all aspects of the selection process and to conduct an "independent assessment" if desired. And finally, prior to final selection of subcontractors, UDLP is required to brief the results of its evaluation and intended selections to the Program Executive Officer for Armored Systems Modernization.

LONGBOW

Question. The Longbow program is an upgrade to the Apache and will also be used on some Comanche helicopters. It will provide fire control radar for 227 of the 758 Apaches, allowing target acquisition at night, through smoke/dust, and in adverse weather conditions. The program also provides a radio frequency seeker for the Hellfire missile. The budget request is for $191 million.

Please describe the tests that the Longbow Apache Fire Control Radar (FCR) and the Longbow Hellfire missile underwent in fiscal year 1994 and the results.

Answer. Government Electromagnetic Vulnerabilities/Hazards of Electromagnetic Radiation to Ordnance Testing was accomplished in October 1993 at the Naval Air Warfare Center, Patuxent River, Maryland and in November 1993 at the Naval Surface Warfare Center, Dahlgren, Virginia. The purpose of these tests was to ensure that electromagnetic radiation from outside sources does not critically affect the Longbow mission capability or create safety hazards. Testing showed that the electromagnetic hardening techniques employed during design were successful. No critical vulnerabilities or safety concerns were found. An early production model Longbow is scheduled to be tested to ensure that the production process does not create any anomalies.

The two major test programs for Longbow Hellfire ongoing in fiscal year 1994 are the Component Qualification Testing (CQT) and the missile flight test program. All components except for the Intermediate Frequency (IF) Receiver, Inertial Measurement System (IMS), Guidance Section Sensor Group, transceiver, de-icing cover, and container have successfully completed CQT. All components, with the exception of the transceiver, de-icing cover and container, are scheduled for completion in May 1994. A limited transceiver qualification will be conducted on the present configuration with a final comprehensive qualification program conducted upon completion of a producibility program. This program will significantly improve producibility while lowering production costs. The estimated date for completion of the limited qualification is May 1994; the estimated date for completion of the final qualification is December 1994. A management decision was made to reschedule the de-ice cover and container qualification tests to the July–December 1994 time period to accommodate funding constraints on the program.

Six flights have been conducted in the missile flight test program to date. Flights 1 through 4 were completed successes with flight 5 resulting in successful data collection with a near miss of the tank target. Flight 6 was completely successful.

Question. It appears that Initial Operational Test and Evaluation (IOT&E) is funded in two places for Longbow Apache—$56 million is included in project DC31 and another $24 million is included in project D2DT. Is IOT&E going to cost $80 million? Please explain.

Answer. The $24 million contained in project D2DT represents Operational Test and Evaluation Command funds and will be utilized for the actual conduct of the test, including threat forces, range instrumentation and computer resources, salaries, cost of travel, other range costs, plus spares and equipment required to support the operational unit during the three month test.

The $56 million contained in DC31 represents project funds, including incremental funding provided to the prime contractor for conduct of the total Engineering and Manufacturing Development (EMD) program leading up to IOT&E, and Longbow peculiar equipment required to be on hand for support to the tests. The entire amount is not associated exclusively with the conduct of IOT&E, but rather includes incrementally funded contractual development work associated with the entire Work Breakdown Structure leading up to that test, as well as government salaries, government furnished equipment, and support contracts associated with preparing for the test, plus test reports, data reduction efforts and other EMD tasks performed as a result of, and/or subsequent to IOT&E.

There is no duplication between or among the effort and equipment funded under Project D2DT and Project DC31.

Question. A few years ago, additional funds were provided for the Hellfire missile portion of the program in order to accelerate it and keep it on schedule with the Apache Fire Control Radar (FCR) part of the program. Are the missiles and FCR programs on the same schedule now?

Answer. Referenced funds provided to the Hellfire missile program were specifically earmarked for corrections of previous technical problems associated with the missile transceiver in order to bring that aspect of the missile program back into line with the master program schedule. To date, all Department of the Army directed transceiver milestones have been successfully achieved according to schedule, and the development programs for the missile and FCR are running concurrently. The EMD contracts for both the missiles and FCR are on schedule for completion in May 1995 and March 1995 respectively. Both programs are planning on Initial Production Facilitation/Long Lead Time Items contract awards in November 1995. At this time, both programs are on schedule for the November 1994 contract awards.

Question. Please provide detailed schedules and milestones for he remainder of the Hellfire missile and Apache fire control radar programs.

Answer. The Longbow Apache Engineering and Manufacturing Development phase is approximately 75–80 percent complete. Airworthiness tests with the Fire Control Radar mounted have been completed. Contractor flight testing of both the missile and aircraft are ongoing and should be completed by the end of 1994. Currently, there are six prototype aircraft flying, the sixth having just flown its first flight on March 4, 1994. Government technical tests will being in July 1994 with the Force Development Test and Experimentation in October 1994 and the IOT&E at Ft. Hunter-Liggett, California, in January 1995.

Additional schedule information is available in the Selected Acquisition Report.

Question. According to May 1993 Bottom-Up Review documentation, a technical assessment panel of experts reviewing the Longbow program indicated that the value of the Longbow program may be overstated in that the radar detects and classifies, but cannot recognize or identify targets. Please comment.

Answer. The Longbow Fire Control Radar (FCR) provides the Longbow Apache attack helicopter rapid targeting capability. The FCR searches, detects, locates, classifies, and prioritizes ground and airborne targets and sends the data to the aircraft weapons processor to cue the target acquisition designation sight, direct gun/rocket fire, and handover targets to the onboard Longbow missile and other members of the combined arms team via the improved data modem. The FCR will classify targets as moving or stationary tracked/wheeled vehicles, stationary air defense systems, hovering or flying helicopters, and fixed wing aircraft in flight. The FCR cannot recognize nor identify targets beyond the general classification as previously stated. However, Longbow can be employed when targets are within close proximity to friendly forces. The aircrew is able to achieve positive identification by linking the electro-optical sensors with the FCR and confirming visually. Through the use of the FCR's capability of detecting and displaying targets in high priority fire zones and ignoring targets in no fire zones, aircrews know they are accurately firing at an enemy force. The Longbow Apache can fire the semi-active laser designated Hellfire missile, which is extremely effective when friendly and threat vehicles are in close proximity to one another.

Question. Can the Longbow Hellfire missile hit targets further out than the radar can see them? if so, does this prevent friendly fire problems?

Answer. The range of the Longbow Hellfire missile is a function of its inherent Hellfire II bus capability coupled with the capability of its self-controlled millimeter radar seeker. Its effective range is longer than that of the fire control radar. However, the missile only needs target position information from a target acquisition device. This can be the FCR or any other device, such as the Target Acquisition Designation System (TADS). The range of the TADS (for target position information) is comparable to the Longbow Hellfire missile. The Longbow Hellfire missile is programmed to attack the target that is "handed over" to it by the target acquisition device. It does not acquire targets autonomously. Therefore, the range "mismatch" poses no unique friendly fire problems.

Question. The General Accounting Office (GAO) tells the Committee that the Longbow's stationary target acquisition specification has been reduced because the system was unable to achieve it. What is the impact of reducing this specification on the user? Will our pilots have to accept greater risks with this reduction?

Answer. The U.S. Army Material Systems Analysis Activity (AMSAA), as part of their independent evaluation of Longbow during the Proof of Principle Phase, performed a sensitivity analysis of Stationary Target Indicator (STI) which showed the requirements were overstated. This analysis is documented in the Independent Evaluation Report of the Longbow, dated February 1991. At a Conventional Systems Committee review of the Longbow Program on February 11, 1992, the U.S. Army Training and Doctrine Command (TRADOC) System Manager for Longbow briefed the results of the AMSAA sensitivity analysis and recommended changes to the STI requirement in the Longbow Required Operational Capability (ROC). These commended changes to the Longbow ROC were previously briefed to and verbally approved by the Assistant Deputy Chief of Staff for Operations and Plans-Force Development on February 5, 1992. Only after receiving the user community approval of these changes were the FCR specifications changed.

No greater risks will be required of our pilots. The reduction was made to coincide with the performance determined by the AMSAA sensitivity analysis that showed the greater combat effectiveness was still being retained.

Question. What compensation did the Army receive from contractor for this reduced performance?

Answer. While the Army acknowledges a change to performance parameters in the Acquisition Program Baseline, we did not reduce the system requirement. The requirements were revised to provide for a more descriptive performance measurement. This revision was based on a sensitivity analysis and takes into account FCR capabilities at different ranges capitalizing on the FCR's design maturation since the Milestone II decision in December 1990. The original Prime Item Development Specification (PIDS) document included a requirement only for Probability of Detection (Pd) and Probability of Correct Classification (PCC) for stationary targets at maximum range. The revised PIDS now includes requirements for PD and Pcc stationary target performance in near bar and far bar ranges, as well as at the maximum range (wide sector scan). Additionally, a scan-to-scan correlation requirement and performance requirements were added for Pd and Pcc stationary target performance in near bar, far bar, and at maximum ranges for the narrow sector scan. The Pd values for near bar range (in both the wide and narrow sector scans and for far bar range in the narrow sector scan) are greater than the original Pd value at maximum range. The accomplishment of these PIDS changes results in a redefinition of PIDS requirements, not lessening of requirements. This results in a increase in the complexity of the contract, not a decrease in the required contract performance. Revision of the performance parameters redefines the technical approach toward the Longbow requirement, with the goal of increasing the capability of the Longbow system.

HIGH ENERGY LASER SYSTEMS TEST FACILITY (HELSTF)

Question. The Army indicates that neither the government nor private industry has high energy laser test requirements beyond fiscal year 1994. What is the basis for this conclusion?

Answer. In light of the diminishing workload experienced at the High Energy Laser Systems Test Facility (HELSTF) in recent years, the Office of the Secretary of Defense (OSD) conducted a potential workload survey of the Army, Air Force, Navy, National Aeronautics and Space Administration, and the Departments of Energy and Commerce. A brochure describing HELSTF's capabilities was provided to each addressee on June 14, 1993, requesting responses by July 9, 1993. Additionally, OSD published a notice in the Commerce Business Daily on August 6, 1993 in an effort to identify government and academic institutions which could potentially use the HELSTF capabilities, requesting a letter of interest by August 31, 1993. Results of these surveys identified no additional test programs beyond the two already funded and scheduled (Navy Point Defense Demonstration; AF Airborne Laser Target Lethality test). Both of these tests will be completed by the end of fiscal year 1994. The Army continues to pursue every reasonable option which might offer a cost effective means of retaining the unique capabilities of HELSTF. HELSTF is conducting yet another survey to identify funded work for fiscal year 1995 and beyond, and once complete, the Army will coordinate its findings with the Congressionally mandated "High Power Laser Program Guidance" report. However, any optimism must be tempered by reality. The reality is that similar investigations, as referenced above, have not succeeded in identifying funded programs requiring HELSTF support. Until concrete evidence of funded programs requiring HELSTF appear, the only prudent course is to continue to plan for closure. The Defense budget drawdown engenders difficult decisions. The Army cannot afford to maintain a test and evaluation facility when a funded present and future customer base does not exist.

Question. Are there any programs in the development phase that could involve directed energy or kinetic energy technology?

Answer. The Army has tactical weapons systems and theater ballistic missile systems in various phase of development that could involve directed energy or kinetic energy technology. However, the Army has not identified any systems development programs that require high energy laser testing at the High Energy Laser System Test Facility beyond fiscal year 1994.

SENSE AND DESTROY ARMOR (SADARM)

Question. Sense and Destroy Armor (SADARM) is a submunition designed to detect and destroy indirect, stationary enemy fire systems (self-propelled howitzers, armored personnel carriers). In fiscal year 1994, the Appropriations Committees directed the Army to terminate the program while the Armed Services Committees directed that the program be put on hold and reassessed. The Appropriations Committees recently sent letters reiterating that the program be terminated. What is the current status of the SADARM program in the Army? Are you following the Committee's direction?

Answer. The Army concluded verification tests at Yuma Proving Ground on April 21, 1994. Based on the successful results of these tests, and subsequent congressional approval, the Army will allow the program to compete for scarce research and development funding. An analysis of artillery needs confirms the requirement for an artillery delivered "smart" SADARM-like submunition. The Army informed the Appropriations Committees of this course of action in correspondence in April 1994, requesting support to enable the Army to make an informed decision on the program.

Question. The Committee understands that the Army apparently spent 1994 SADARM funds for purposes other than termination.

How much of the $28.5 million provided for fiscal year 1994 remain to apply to termination costs for the program? How much is needed? What is the Army's source for the remaining funds?

Answer. As of the end of April 1994, approximately $1.9 million remains. If the SADARM program is to be terminated, an additional $15.6 million would be required. If the termination cost is to be paid using fiscal year 1994 funds a reprogramming action would be required. Termination cost paid using fiscal year 1995 funds would be part of the $72 million requested.

Question. The Army has requested $72 million for SADARM in fiscal year 1995. Please provide a detailed breakout of how this funding is to be used, for the record.

Answer. The $72 million requested for fiscal year 1995 will be used to resolve the submunition collision problem, and improve the fuse, safe and arm mechanism. Additionally, resources will be expended to improve reliability, conduct producibility analysis, provide systems for hardware-in-the-loop simulations, accomplish configuration updates and conduct additional testing. Funds may be required to requalify some vendors if an extended slip in the program takes place. The majority of the funds will go to the primary contractor, Aerojet Electronic Systems, with lesser amounts to a number of other organizations.

	Millions
Contractors (Prime, Subs, Vendors)	$59.9
Program Management Office and Armament Research Development and Engineering Center	4.8
Yuma Proving Ground	2.3
Other Government Agencies	1.3
Missile Command	1.5
Other	2.3
Total	72.1

Question. If Sense and Destroy Armor (SADARM) is terminated, would the Army consider buying AT–2 or terminally guided warhead (TGW) for Multiple Launch Rocket System (MLRS)?

Answer. The Army is currently analysing several alternatives to SADARM for MLRS, one of which is TGW. AT–2 is not considered a viable alternative; it is not a "smart" munition and does not attack the targets or perform the mission for which SADARM was designed.

SIMULATION PROGRAM

Question. The request for modeling and simulation increased from $10 million for fiscal year 1994 to $52 million for fiscal year 1995. Why such a big increase?

Answer. Three science and technology (S&T) programs primarily develop modeling and simulation (M&S) tools in support of the development of Distributed Interactive Simulation (DIS). They are Battlefield Distributed Simulation-Developmental (BDS–D) Advanced Technology Demonstration (ATD), Anti-Armor (A2) ATD, and Advanced Concepts and Technology (ACT) II program.

BDS–D ATD increase of $4.1M supports integration of the dismounted infantry into the DIS environment and continued development of Semi-Automated Forces [battalion level].

A2 ATD did not grow.

ACT II program was newly established in FY94 at $10 million due to funding constraints and initial program definition and start-up. ACT II funding averages approximately $40 million per year FY95–01. ACT II is focused on bringing industrial concepts and innovations to address Battle Labs needs through hardware demonstrations and modeling and simulations including the selective use of DIS.

The funding for these programs is as follows:

[In millions of dollars]

	FY94	FY95
BDS–D ATD:		
PE 62308 AC90	0.0	11.1
PE 62727 A230	4.4	0.0
PE 63003 DB39	2.6	0.0
A2 ATD: PE 63003 DB 39	10.0	9.9
ACT II: PE 62308 C99	[1]10.0	[1]40.5
Total	27.0	61.5

[1] Approximately 35% of the ACT II program supports the development of M&S and DIS. ACT II efforts [contracts] are primarily determined based on Battle Labs needs.

Question. The Army has two new start programs regarding distributive interactive simulation for a total of $20 million. What is distributive interactive simulation? Why is it needed?

Answer. The Army does not have any new start programs regarding DIS. Beginning in FY 95, the Army S&T program restructured the funding in support of DIS. In FY94, BDS–D ATD is funding in PE 63003 DB39 and PE 62727 A230. In FY 95, BDS–D ATD is funded in 62308 AC90. This restructuring improves the focus of the Army's DIS efforts.

DIS is the selective, geographically separated linking of constructive, virtual and/or live simulations, each hosted on a computer and connected via communications networks, to create a shared synthetic environment that acts together and upon one another [may include humans as a part of the simulation].

The synthetic environment created through the augmentation of DIS will provide the synergistic network for modeling and simulation to be used by DoD, industry, and academia. This synthetic environment will fundamentally alter how U.S. military forces acquire weapon systems and train under real time wargame scenarios. It will do this by empowering thousands of talented individuals and teams, traditionally separated through invisible functional barriers, to work as one. DIS will be capable of including the many DoD live, constructive, and virtual models and simulations that are employed and selectively linked as a synthetic environment to support the conduct of training and acquisition of weapon systems. This capability coupled with the effective inclusion of this empowered force, will significantly augment the U.S. capability to meet the future training and acquisition needs of improved performance. Trainers, developers, users, and policy makers will have access (i.e., entry portals) to many levels of information pertaining to this process, both classified and unclassified, without regard to global location. Perspectives and results will be able to feed-back and feed-forward for continual development of comprehensive decision metrics at every stage of the training and acquisition process. A virtual warfighting environment will be created capable of incorporating the human factor of war into systems development and training exercises. DIS is a critical enabling tool required by the Army's Louisiana Maneuvers process, training exercises, Battle Labs, ACAT I and II programs, Top Level Demonstrations (TLD), ATDs and other efforts requiring this modeling and simulation capability.

Question. Please provide for the record what the Army is requesting for all simulation projects and in which program elements.

Answer. The Army is requesting funding for simulation projects in several programs. The table of funding above is only Army S&T requests for FY 95 simulation projects in support of DIS.

Question. What controls does the Army have to ensure minimal redundancy among simulation projects?

Answer. The Army S&T simulation projects are managed and controlled in accordance with the Army's Science and Technology Master Plan (ASTMP). The ASTMP is reviewed and revised as necessary on an annual basis. Additionally, the Army is developing a Modeling and Simulation Master Plan, DIS Modernization Plan and DIS Master Plan. These corporate documents, identification of Battle Labs and Louisiana Maneuvers needs and other documentation such as Simulation Support Plans for all Acquisition Category (ACAT) I and II programs and ATD/TLDs ensure that minimal redundancy exists between simulation projects.

FISCAL YEAR 1995 ARMY RDT&E PROGRAMS

Question. Which programs is the Army requesting fiscal year 1995 funding for—that directly support the Ballistic Missile Defense program?

Answer. Program Executive Office, Missile Defense has two programs that have requested Army funds (Patriot and Joint Tactical Ground Station (JTAGS)) but the programs complement Ballistic Missile Defense Organization (BMDO) programs rather than direct support.

Question. Why are these programs funded in the Army rather than in the Ballistic Missile Defense program?

Answer. BMDO provides funds for Anti-tactical Ballistic Missile (ATBM) programs. The Army's development program for the Patriot provides for improvements to the current system upon which PAC–3 (BMDO funded) is based. The fiscal year 1995 request is for continuation of the communications upgrades and generator development programs. These programs enhance the basic Army funded system capabilities. At the time the Army made a decision that a JTAGS capability was required, BMDO was funding and supporting the Air Force Talon Shield program. Since Talon Shield is centrally located in the continental United States (CONUS), it requires access to long haul communication assets that are subject to single-point failure and does not meet the Army's requirements for an in-theater capability.

Question. How do the Army programs complement the BMDO effort?

Answer. Army funded programs complement the work funded under BMDO by enhancing basic system capabilities of the computer, radar, and communications, while also improving survivability of defended assets and Patriot/Theater High Altitude Area

Defense (THAAD) against attack by aircraft and non-ballistic missiles. These improvements provide enabling capabilities upon which the BMDO improvements are based. An example is the Army funded weapons control computer which has expanded memory and processing capability. JTAGS is the deployable in-theater component of the United States Space Command's Tactical Event System (TES) which includes the Air Force Talon Shield/ALERT program and the Navy's Tactical Detection and Reporting (TACDOR) program. JTAGS will provide warning, alerting, and cueing data to passive defense and attack operations elements as well as active defense elements including BMDO funded Patriot PAC–3 and THAAD programs.

Question. Are these programs of such low priority that BMDO refused to fund them?

Answer. No. There is a single Organizational Requirements Document (ORD) for the Patriot system which outlines the Army's needs. The Army and BMDO fund those programs which respond to ORD requirements in their respective mission areas. Were the entire funding line to be transferred to BMDO, the Army's needs beyond just Theater Missile Defense improvements would most likely be at the lower end of BMDO's overall priorities since it is not BMDO's mission to provide defense against air breathing targets. No. The BMDO and Army funded programs are complementary.

[CLERK'S NOTE.—End of questions submitted for the record.]

TUESDAY, MARCH 15, 1994.

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, AIR FORCE

WITNESSES

DARLEEN A. DRUYUN, DEPUTY ASSISTANT SECRETARY OF THE AIR FORCE FOR ACQUISITION

LT. GEN. RICHARD E. HAWLEY, PRINCIPAL DEPUTY ASSISTANT SECRETARY OF THE AIR FORCE FOR ACQUISITION

INTRODUCTION

Mr. DICKS. The Committee will come to order.

Today the Committee will discuss the Air Force's Research, Development, Test and Evaluation request for approximately $12.3 billion. The Committee is pleased to welcome Ms. Darleen A. Druyun, who is the Air Force's Acting Acquisition Executive, pending Senate confirmation of the Administration's candidate. She is accompanied by Lieutenant General Richard E. Hawley, Principal Deputy Assistant Secretary of the Air Force for Acquisition.

Both witnesses are today making their first appearances before the Committee in their current capacities. The Committee will include your biographies in the record.

Ms. Druyun, do you have a brief opening statement?

Ms. DRUYUN. No, sir. I would like to submit for the record the prepared statement, and General Hawley and I are very pleased to appear before the Committee today and look forward to answering your questions.

Mr. DICKS. General, do you have anything you want to say.

General HAWLEY. No, sir. We look forward to your questions.

Mr. DICKS. Thank you. Your prepared joint statement will be made part of the record.

[The biographical sketches and joint statement of Ms. Druyun and General Hawley follow:]

Biography

United States Air Force

Secretary of the Air Force, Office of Public Affairs, Washington, D.C. 20330–1000

DARLEEN A. DRUYUN

Darleen A. Druyun is deputy assistant secretary for acquisition, Office of the Assistant Secretary of the Air Force for Acquisition, Washington, D.C. She provides assistance to the assistant secretary for acquisition in the formulation, direction and supervision of plans, policies and programs for the procurement and production of goods and services, including major weapons systems for the Air Force.

Ms. Druyun was born Nov. 7, 1947, in Vallejo, Calif. She earned a bachelor's degree in political science from the University of Chaminade in 1968 and completed her course work toward a master's degree from the University of Kentucky in 1970

She began her federal service career as a contracts negotiator at the Warner Robins Air Logistics Center, Robins Air Force Base, Ga., in June 1970. Other assignments include contracting officer, Lackland Air Force Base, Texas; procurement analyst, Headquarters U.S. Air Force, Washington, D.C.; contract specialist, Contract Review Committee, and director of contract clearance and policy development, Headquarters Air Force Systems Command, Andrews Air Force Base, Md.

Ms. Druyun was deputy associate administrator of the Office of Management and Budget's Federal Procurement Policy Office from July 1980 until June 1982. She was responsible for administering government-wide policies on major systems acquisition and consulting services and was a principal author of the Reagan administration's proposal for a Uniform Federal Procurement System which was the genesis of the Competition in Contracting Act. She also wrote Executive Order 12352 on "Federal Procurement Reforms," which was issued March 17, 1982. In June 1985 she was appointed the principal assistant deputy chief of staff, contracting, Air Force Systems Command headquarters. In this capacity, she was the senior contracting civilian in AFSC and provided direction and oversight in one of the largest buying operations in the world. She was directly responsible as the command's chairperson of the Acquisition Strategy Panel for the planning and execution of contracting strategies designed to translate Air Force requirements into operational defense systems.

Prior to joining the staff of the secretary of the Air Force, Ms. Druyun served as associate administrator for procurement at the National Aeronautics and Space Administration (NASA). She was directly responsible for providing functional management leadership and direction of procurement activities. In April 1992 she was appointed NASA's chief of staff, responsible for providing counsel on all matters of policy and agency procedure; and coordinating all initiatives, directives and documents developed at the administrator's request. Also, she was the primary liaison with the White House and coordinated all staff activities in the immediate office of the administrator. She was appointed to her current position in February 1993.

Ms. Druyun's awards and recognitions include the Presidential Rank Award for Meritorious Executive, Senior Executive Association's Executive Achievement Award, Presidential Rank Award for Distinguished Executive, Air Force Meritorious Award, Air Force Distinguished Service Award, NASA's Outstanding Leadership Medal, and NASA's Distinguished Service Medal.

She is married to William S. Druyun. They have two daughters, Heather Leanne and Erin Nicole.

(Current as of March 1993)

BIOGRAPHY

UNITED STATES AIR FORCE

Secretary of the Air Force
Office of Public Affairs
Washington, D.C., 20330-1690

LIEUTENANT GENERAL RICHARD E. HAWLEY

Lieutenant General Richard E. Hawley is Principal Deputy, Assistant Secretary of the Air Force (Acquisition), Washington, D.C. He serves the Air Force Acquisition Executive in carrying out the management responsibilities for the Air Force acquisition system to include direction, guidance, and supervision over all matters pertaining to the formulation, review, approval, and execution of plans, policies, and programs relative to acquisition.

He entered the Air Force in 1964 following graduation from the United States Air Force Academy. He has commanded an Air Force wing and was commander, U.S. Forces, Japan, and 5th Air Force, with headquarters at Yokota Air Base, Japan, prior to assuming his current position. General Hawley is a command pilot with more than 2,500 flying hours in the C-131, T-39, 0-2A, A-10, F-4 and the F-15. In addition, he served as a forward air controller at Pleiku Air Base, South Vietnam, where he flew 435 combat missions.

General Hawley and his wife, Mary Ellen, have three children: Christopher, Jared, and Richard.

EDUCATION

1964 Bachelor of science degree, U.S. Air Force Academy
1965 Master of Arts Degree in Economics, Georgetown University
1974 Armed Forces Staff College, Norfolk, VA.
1982 Naval War College, Newport, R.I.

ASSIGNMENTS

1. June 1964 - March 1965, student, Georgetown University.
2. March 1965 - September 1966, staff officer, Office of the Deputy Chief of Staff for Personnel, Headquarters, U.S. Air Force, Washington, D.C.
3. September 1966 - September 1967, student, pilot training, Williams AFB, Arizona.
4. October 1967 - September 1968, student, F-4C and 0-2A training at Homestead AFB and Hurlburt Field, Florida.
5. September 1968 - September 1969, forward air controller, Pleiku Air Base, South Vietnam.
6. October 1969 - September 1972, combat crew member, 36th Tactical Fighter Wing, Bitburg Air Base, West Germany.
7. September 1972 - June 1973, member, U.S. Air Forces in Europe inspector general team, Wiesbaden Air Base, West Germany.
8. July 1973 - February 1974, student, Armed Forces Staff College, Norfolk, Virginia.
9. February 1974 - March 1976, operations staff officer, Office of the Deputy Chief of Staff for Plans, Headquarters, U.S. Air Force, Washington, District of Columbia.
10. March 1976 - September 1977, assistant executive officer to the Air Force Chief of Staff, Headquarters, U.S. Air Force, Washington, D.C.
11. September 1977 - July 1979, operations officer, 68th Tactical Fighter Squadron; Assistant Deputy Commander for Operations, 347th Tactical Fighter Wing; and 347th Combat Support Group Commander, Moody Air Force Base, Georgia.
12. July 1979 - July 1981, Director of Operations, 1st Tactical Fighter Wing, Langley Air Force Base, Virginia.
13. July 1981 - July 1982, student, Naval War College, Newport, Rhode Island.
14. July 1982 - April 1984, Vice Commander, 313th Air Division, Kadena Air Base, Japan.
15. April 1984 - March 1986, Commander, 18th Tactical Fighter Wing, Kadena Air Base, Japan.
16. March 1986 - September 1986, Special Assistant to the Commander in Chief, Pacific Air Forces, Hickam Air Force Base, Hawaii.
17. September 1986 - August 1987, Vice Commander, 7th Air Force, Osan Air Base, South Korea.
18. August 1987 - August 1989, Deputy Chief of Staff for Plans, Headquarters, Pacific Air Forces, Hickam Air Force Base, Hawaii.
19. August 1989 - August 1991, Director of Operations, Office of the Deputy Chief of Staff, Plans and Operations, Headquarters, U.S. Air Force, Washington, District of Columbia.

20. August 1991 - November 1993, Commander, U.S. Forces, Japan, and 5th Air Force, Yokota Air Base, Japan.
21. November 1993 - present, Principal Deputy, Assistant Secretary of the Air Force for Acquisition, Washington, District of Columbia.

FLIGHT INFORMATION

Rating: command pilot
Flight hours: More than 2,500
Aircraft flown: C-131, T-39, 0-2A, A-10, F-4, F-15
Combat missions flown: 435

MAJOR AWARDS AND DECORATIONS:

Defense Distinguished Service Medal
Air Force Distinguished Service Medal
Legion of Merit
Distinguished Flying Cross with two oak leaf clusters
Meritorious Service Medal with oak leaf cluster
Air Medal with two silver and two bronze oak leaf clusters
Air Force Commendation medal with oak leaf cluster

EFFECTIVE DATES OF PROMOTION:

Second Lieutenant	Jun 3, 1964	Colonel	Jun 1, 1979
First Lieutenant	Dec 3, 1965	Brigadier General	July 1, 1986
Captain	Dec 3, 1967	Major General	Aug 1, 1989
Major	Jan 1, 1972	Lieutenant General	Aug 2, 1991
Lieutenant Colonel	Apr 1, 1976		

DEPARTMENT OF THE AIR FORCE

PRESENTATION TO THE COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEE ON DEFENSE
UNITED STATES HOUSE OF REPRESENTATIVES

SUBJECT: Air Force Research, Development, Test and Evaluation

STATEMENT OF: DARLEEN A. DRUYUN
Deputy Assistant Secretary of the Air Force
(Acquisition)

LIEUTENANT GENERAL RICHARD E. HAWLEY
Principal Deputy Assistant Secretary of the Air Force
(Acquisition)

MARCH 1994

NOT FOR PUBLICATION UNTIL RELEASED
BY THE COMMITTEE ON APPROPRIATIONS,
UNITED STATES HOUSE OF REPRESENTATIVES

Mr. Chairman and Members of the Committee:

It is our pleasure to appear before you to review and discuss the Air Force's Research, Development, Test and Evaluation (RDT&E) activities in the Fiscal Year 1995 (FY 95) President's Budget.

The Air Force RDT&E request for FY 95, $12.35 billion, recognizes the budget pressures resulting from downsizing of the military services and from the emphasis to maintain current readiness levels and capabilities. This FY 95 request is less than one percent above the FY 94 Air Force RDT&E appropriation of $12.26 billion.

Despite these budgetary pressures, the Air Force continues to make wise RDT&E investments for the future. These RDT&E efforts seek to complement and improve near-term capabilities, as well as lay the foundation for the revolutionary capabilities that will be critical to our future success. Today's RDT&E investment directly influences tomorrow's readiness.

Today, we will discuss Air Force RDT&E programs by starting with the Science and Technology efforts, including test and evaluation. Then we'll cover the specific areas supporting the objectives of Global Reach - Global Power: power projection, nuclear deterrence, command and control, and global mobility.

SCIENCE AND TECHNOLOGY

The Air Force Science and Technology (S&T) programs provide the competitive advantage and maximum war fighting potential of advanced technology. The Air Force must protect this technological advantage as we move towards a smaller force in a more volatile and destabilized world. To maintain superior war fighting capabilities that can be effective in regional and larger conflicts, there is an ongoing compelling need for continued development of a balanced set of technologies for a wide spectrum of weapon systems and combat scenarios.

The FY 95 budget request provides a balanced S&T Program that addresses both near and far term Air Force war fighting needs. We are focusing the S&T Program on technologies that will result in superior weapon systems that are both sustainable and affordable. Military technological advances will continue to pose challenges to our forces both to keep up with emerging technologies and to get the greatest potential from the systems we have.

The Air Force has remained steadfast in stressing the importance of quality in our systems, or "maintaining the technology edge." Today, the balance of weapon systems available to potential adversaries is shifting from quantity to technological quality, so the need for developing advanced technologies remains. Importantly, the Congress has consistently supported our approach of fielding technologically superior weapon systems. The S&T programs are integral to that approach and have a very clear purpose: developing the technologies that will become the cornerstone for future Air Force war fighting capabilities. These programs are about America's security, about deterring war, about winning decisively if war is forced upon us, and about minimizing casualties and collateral damage.

One of our most important technology programs has focused on the development of hypersonic technology. Hypersonic aerospace vehicles operating at speeds in excess of Mach 5 and as high as Mach 25 will allow us to project forces anywhere in the world within hours, providing timely response for crisis intervention, strategic reconnaissance, counter-terrorist operations, as well as responsive space launch. The Air Force is committed to continued hypersonic systems technology development now to meet our future requirements.

Since its inception, the National Aerospace Plane (NASP) program has been the cornerstone of hypersonic technology development in the Air Force, Department of Defense, and the United States. As the Air Force's "flagship" Science and Technology program, NASP produced significant technical accomplishments in aerodynamics, thermodynamics, materials, structures, propulsion, and computational tools. In response to FY 1994 congressional direction, the current phase of the NASP program will be completed at the end of this year, thereby terminating the program.

Our position is that a vigorous technology program in hypersonic vehicles should be retained. Therefore, the Air Force, jointly with NASA, has developed a joint, focused hypersonic systems technology program that builds upon the accomplishments of NASP and addresses the key hypersonic technology that poses the greatest technical challenge: the supersonic combustion ramjet (scramjet) propulsion system. The Air Force goal is an affordable, lower-risk, hypersonic technology program that will provide revolutionary technical capability to the Air Force from a prudent investment. The joint goal is to demonstrate the performance and operability of a scramjet engine at very high Mach numbers (Mach 12-15) through a robust ground and flight experiment program using excess ballistic missile assets.

The Air Force S&T Program and the Air Force Manufacturing Technology Program contribute to the maintenance of the U.S. industrial base by transferring dual-use technology to the private sector and by adapting commercial products and technologies to meet military needs. For example, our work in turbine engines has revolutionized the commercial airline industry. Composite materials that were developed to make our aircraft lighter and faster, are now found throughout the commercial sector. The shoulder harness used by car manufacturers was originally developed for fighter aircraft. Furthermore, commercial electronics are being developed that often meet military requirements that would previously have required costly military-unique development and production. These are but a few examples, and we will continue these efforts. We are committed to supporting technology transfer, spin-off, spin-on and dual-use technologies. The sharing of information and expertise through technology partnerships involving industry, government, and academia, not only benefits the Air Force but the economy as well.

The Air Force Manufacturing Technology (MANTECH) Program will also integrate advanced manufacturing and production methods into the product technology development process at the earliest stages. This early integration maximizes the positive impact MANTECH can have on reducing the high manufacturing costs associated with emerging technologies and the systems to which they lead. The Air Force has a strong MANTECH infrastructure that is focused to provide manufacturing technology for Service needs, and that through spin off and spin-on technologies supports the United States commercial industrial base. The Air Force will continue to work with OSD and Congress to optimize the management structure of the MANTECH Program.

Test and Evaluation (T&E) also is very important to maintain superior war fighting capabilities. Advanced technology insertion (modifications and planned upgrades), require additional testing of existing weapon system platforms. Moreover, as weapon system acquisition continues towards extended development schedules with fewer production units, the importance and length of testing increases. With fewer units being procured, increased confidence in performance and knowledge of limitations must be factored into full-scale production decisions and employment tactics.

The Air Force T&E staff is producing a test infrastructure investment master plan, institutionalizing a disciplined test process, and consolidating test activities. We are also supporting the newly formed Tri-Service Executive Agent Board of Directors. Their tasking is to develop strategies to streamline and consolidate the Services' T&E infrastructure. Our challenge is to match continuing advances in technology and demands on our facilities and people with the requisite test capabilities in this declining budget environment. Obtaining this balance helps insure that we can provide the proper capabilities to our fighting forces.

POWER PROJECTION

Control of the air is the first concern of any joint force commander. To ensure that our country decisively and quickly gains such control, we must continue to fully fund the Engineering and Manufacturing Development (EMD) of our number one acquisition program -- the F-22 Advanced Tactical Fighter.

The F-22 is a keystone of the Air Force's long-term investment strategy. The F-22 incorporates stealth, super cruise, and highly integrated avionics to ensure a decisive U.S. advantage and to help to ensure survivability as well as simplify aircraft maintainability and supportability. These qualities will make the F-22 the world's premier air superiority fighter for the next 40 "plus" years.

Key to bringing this capability on line lies in giving our program managers funding stability to properly execute the program. The FY 95 RDT&E request will fund efforts leading to a Critical Design Review in mid-FY 95. Funding reductions at this stage would disproportionately affect key schedule milestones and total program cost.

Meanwhile, we must continue to maintain the safety, survivability and effectiveness of the F-15 and the F-16 aircraft to effectively employ our reduced fighter force across a wide spectrum of potential threats. Our budget request funds essential upgrades to these aircraft, such as the APG-63 radar upgrade for the F-15. This upgrade will replace obsolete parts to insure the F-15's radar remains reliable and maintainable.

Looking to the future, the Secretary of Defense initiated the Joint Advanced Strike Technology (JAST) Program to serve as DOD's focal point for defining future strike systems. Using a joint Department of the Navy and Department of the Air Force integrated product team of war-fighters and technologists, the JAST Program will transition and demonstrate affordable technologies and manufacturing processes that will reduce the life cycle cost of future strike systems and promote joint service use and commonalty to support successful development and production of next generation strike weapon systems for the U.S. Air Force, U.S. Navy, U.S. Marine Corps and our allies.

Close Air Support (CAS) remains one of the highest priority missions for the Air Force. The Army and the Air Force have agreed on a modernization approach that meets the need, recognizes the dramatic changes that have taken place since 1990, and saves nearly $1.5 billion over previous plans. The Air Force is funding affordable, carefully tailored modifications to the A-10 and F-16 Block 30 and Block 40 fighters to meet the Army's and the Air Force's CAS requirements.

To ensure U.S. global power projection capability, the Air Force must upgrade the conventional capabilities of the heavy bomber force while maintaining their nuclear deterrence role. The bomber force already has a robust conventional capability, but must be able to deliver more modern, accurate, and precise conventional weapons from either U.S. or forward bases to any point on the globe. The 1992 Bomber Roadmap sets forth our plan to modernize the bomber force, and the September 1993 Bottom-Up Review validated this plan. The Air Force will rely on a mix of B-2s, B-1s, and B-52s, equipped with the most modern conventional weapons, to provide global power projection capability well into the 21st century.

The B-2 now being fielded makes use of our most advanced technologies. It gives us the capability to destroy the most highly valued targets without supporting forces. The B-2 program is well on its way to providing the U.S. a fully operational 20-aircraft fleet. On December 17, 1993, the first operational B-2 arrived at Whiteman AFB, Missouri. In addition, the Air Force, in conjunction with OSD, is in the final stages of developing an efficient and effective depot support concept for the B-2.

With the B-2 fleet capped at 20 aircraft and B-52 force reductions underway, the B-1 will deliver the lion's share of conventional weapons. Its unique characteristics -- large payload, long range, and fighter-equivalent speed -- will, when coupled with planned weapons and electronic countermeasures (ECM) upgrades, make the B-1B the primary conventional bomber for the 21st century. The FY 95 request for RDT&E will fund risk reduction planning for defensive avionics upgrades, planning and mission support in preparation for the ECM program restart in FY 96, integration of Joint Direct Attack Munitions (JDAM), simulator development, and Global Positioning System (GPS) and anti-jam radio integration.

In the air-to-surface arena, the Joint Direct Attack Munitions (JDAM) will provide increased accuracy in both clear and adverse weather/environmental conditions from medium and high altitudes and will be available on most Air Force and Navy aircraft. JDAM will initially upgrade existing 1000 and 2000 pound bombs with Inertial Navigation System/Global Positioning System (INS/GPS) guidance kits, and will eventually add further guidance improvements. We plan to begin a two-contractor competitive effort for detailed design and manufacturing development soon, incorporating Pilot Program concepts from Dr. Perry's Acquisition Reform initiatives. Additionally, another program, the Navy-led Joint Standoff Weapon (JSOW), is developing a common vehicle incorporating two submunition payload variants (the CEM-97 and the Sensor Fused Weapon's BLU-108).

The TriService Standoff Attack Missile (TSSAM), as the centerpiece of our standoff munitions procurement effort, brings together all the essential elements -- low observability, standoff range, and true launch-and-leave capability -- needed to maximize survivability of the launch platforms. FY 95 RDT&E efforts support the Air Force's low-rate production decision of the submunition variant as well as continued integration with the Navy. These modern weapons programs offer great logistics payoffs by reducing the number of weapons that must be moved to a theater to achieve the necessary results.

NUCLEAR DETERRENCE

After we retire our Peacekeeper ICBMs at the end of this decade, the Minuteman III ICBM will be the only land based element of the Triad on day-to-day alert. We are conducting a life extension program to keep the Minuteman III viable well into the next century.

First, we are replacing failing 1960's era guidance electronics with modern, supportable electronics that will minimize life cycle costs. Second, we will remanufacture solid fuel motors to correct age-related degradations to maintain motor reliability. Third, we are modernizing our almost 30-year old launch control centers by installing new consoles that are reliable and user friendly. Fourth, we are modernizing and replacing the unsupportable communication systems used for the strategic command and control of all our nuclear forces.

Our efforts are ensuring the viability of the most cost-effective leg of the Triad through the year 2020.

COMMAND AND CONTROL

Joint STARS, a joint Air Force and Army program, remains on schedule in engineering and manufacturing development. The Defense Acquisition Board approved entry into Low-Rate Initial Production (LRIP) of the first five Joint STARS aircraft in May 1993. Essential improvements to AWACS will improve reliability and maintainability, upgrade electronic counter-counter measures, improve man-machine interfaces, and increase radar sensitivity to ensure effectiveness against evolving threats.

The Air Force is making great strides in consolidating unit level mission planning with the Air Force Mission Support System (AFMSS). AFMSS molds state-of-the-art industry standard software and hardware into an effective mission planning unit that will be used by our war-fighters to maximize combat effectiveness. An evolutionary approach to acquisition ensures that our aircrews receive the best mission planning capability available both now and in the future. Complete integration with all Air Force weapons systems, both manned and unmanned, is on schedule for FY 99.

GLOBAL MOBILITY

The goal of our airlift and tanker programs is to help meet the Air Force Global Reach -- Global Power objectives of supplying rapid global mobility. A core airlifter with the capabilities of the C-17 will go a long way toward fulfilling those objectives.

The direct delivery capability, ground maneuverability, and cargo off-load efficiencies make the C-17 the logical choice to improve the airlift component of strategic mobility and meet future requirements. The C-17 will provide significantly improved capability to project power worldwide. The current workhorse of the strategic airlift fleet, the C-141 is rapidly approaching the end of its useful service life (45,000 hours). Without a replacement aircraft, this nation's ability to project forces worldwide will be greatly curtailed.

The C-17 program has had its share of development problems. Consequently, we have constrained our procurement commitment to no more that 40 aircraft until both the aircraft and the contractor, McDonnell Douglas, prove themselves worthy of a commitment to further production. We are preparing for a Milestone III decision in November 1995 when the department will review test results and the contractor's performance before making a final decision on the program. Additionally, USD (A&T) has proposed a settlement with McDonnell Douglas of existing developmental issues on the program. That settlement is designed to build a firebreak between the troubles of the past and the promise of the future, but will require specific congressional approval to implement.

Since its first flight in September 1991, eleven production aircraft have been delivered; six to the test program and five to the operators at Charleston AFB, SC. As of February 9, 1994, the test aircraft had flown a total of 2,725 hours in 745 missions, and the test program is on track to finish on schedule. Although the test program concludes in early FY 95, our RDT&E request increased from last year to fund the proposed settlement with McDonnell Douglas.

CONCLUSION

The FY 95 RDT&E budget request provides the Air Force with essential new technologies to support our Global Power--Global Reach objectives. We will strive to maximize our efficiency and effectiveness with the funds appropriated to the Air Force.

MINUTEMAN III RESEARCH AND DEVELOPMENT

Mr. DICKS. After Peacekeeper ICBMs retire at the end of the decade, the Minuteman III will be the only land-based element of the nuclear triad on day-to-day alert.

The Air Force plans $4.8 billion of upgrades to the Minuteman III missile to prolong its life to the year 2020. Minuteman III is an early 1970s vintage weapon.

General Hawley, while we understand the Secretary of Defense is conducting a Posture Review of nuclear weapons, we need to discuss why the Air Force needs $152 million in 1995 for Minuteman III R&D. What is the Air Force strategy for upgrades to the Minuteman III missile?

General HAWLEY. Yes, sir.

This request is to begin the refurbishment of our Minuteman III fleet. This will be the second time that we have had to repour the motors for these missiles.

As you know, they were originally designed for a 17-year life. They are at the point now where we expect to encounter reliability problems in the very near future.

In addition, we need to begin work on the guidance units for these weapons. That is also very old 1960's technology. We expect that in a very few years we will also have reliability problems with the guidance and control units.

So we plan to upgrade both the motors and the guidance and control units in order to allow these very cost-effective weapons systems to serve us well into the next century.

As you know, the National Strategy for Deterrence still relies on triad and the Minuteman III remains the most cost-effective leg of that very effective strategy.

Mr. DICKS. Does it really make sense to spend $4.8 billion on the Minuteman while at the same time moving to the posture where our highly survivable and world-class Trident submarines will not carry a full load of nuclear warheads?

General HAWLEY. Of course our program is based upon the current strategy which does rely on the triad concept. I can't predict the outcome of the Nuclear Posture Review, but I would expect that it would confirm the wisdom, both of the triad concept and of maintaining the kind of various cost-effective weapons system that the Minuteman III represents.

ANALYSIS OF MINUTEMAN UPGRADES

Mr. DICKS. Has any formal analysis been done to compare the cost of Minuteman upgrades with other alternatives, such as higher warhead loads on the Trident submarines or the procurement of more B–2 bombers?

General HAWLEY. No, sir.

I am not aware of any such cost-effectiveness analysis comparing those weapons systems, but I would expect that a careful examination of those trade-offs would be a part of the Nuclear Posture Review.

Mr. DICKS. All right. And the review is underway; isn't that correct?

General HAWLEY. Yes, sir. It is.

Mr. DICKS. Is this program a priority in the Air Force?

General HAWLEY. Yes, sir.

Mr. DICKS. The Air Force has recently announced a one-third reduction in planned F–22 fighter aircraft production.

Wouldn't the Air Force be better served by producing higher numbers of F–22 and/or B–2 aircraft rather than investing further in land-based missiles?

General HAWLEY. Well, it is hard to resist more F–22s, sir, but we need to try to maintain a balanced force, and we are required to support our deterrent strategy.

Our contribution to that includes both the Minuteman III, which is what we are going to be doing under START and START II, and the bomber leg of the triad.

We need to maintain a commitment to that very important part of our strategy.

As you know, the Bottom-Up Review sized our fighter force at 20 wings of fighters. And we have traditionally tried to maintain between 20 and 25 percent of our fighter force in the air superiority specialized role.

So the number of F–22s is really derived from that total force structure, and at 20 wings, which is all the Bottom-Up Review says the Nation can afford, we think that we must reduce the buy down to 422 aircraft, which will give us 4 wings of air superiority fighters within that 20-wing force, so we think it is a right course of action.

Mr. DICKS. Tell me again, what are we going to get for the $152 million in 1995 for Minuteman III R&D? What upgrades are planned for the system?

General HAWLEY. What we are going to do is prepare the way for repowering all three stages of the missile. As you know, this is a three-stage missile with three separate motors, all of which must be repowered with new propellants and the linings must be redone, and we will also begin the effort to upgrade the guidance and control unit so that we can achieve greater reliability and extend its life through the end of the first decade of the next century.

Mr. DICKS. We have a few other questions under this title that we will ask for the record.

General HAWLEY. Yes, sir.

B–1B CONVENTIONAL BOMBING CAPABILITY

Mr. DICKS. The Air Force envisions spending $2.7 billion to upgrade the B–1B bomber. Your statement indicates that—with the B–2 fleet capped at 20 aircraft and B–52 force reductions underway, the B–1 will deliver the lion's share of conventional weapons.

In addition, the Air Force plans to make the B–1B—the primary conventional bomber for the 21st century. The budget requests $74 million for B–1B R&D.

General Hawley, what is the B–1B's conventional bombing capability today?

General HAWLEY. Today the B–1B can deliver 84 MK–82 conventional bombs. It can carry them about 5500 miles, roughly the same distance in similar profiles that the B–52 flies.

Mr. DICKS. The MK–82 is a not smart weapon, right?

General HAWLEY. These are not smart weapons.

Mr. DICKS. Are these dropped from the B–52?

General HAWLEY. They are exactly the same weapon that we delivered thousands of, from the B–52, on the Republican Guard during Desert Storm except the B–1 can carry 84 of them and the B–52 carries about 51.

Mr. DICKS. All right. Now, does the B–1 have any problem dropping these particular bombs? Are there any difficulties?

General HAWLEY. No, sir, not currently.

As you know, we had some difficulties getting to where we are now to have the capability to drop these weapons, but we have overcome these difficulties. It has been certified. It can deliver them effectively.

It has been through its Seek Eagle testing for those weapons. The software in the airplane has been modified to provide us with very good accuracy dropping those weapons, and we can load them, as you know.

A few years ago we had a hard time loading all of these bombs on a B–1. We are now able to load the B–1 in about six hours, which is a full load, which is about the same amount of time it would take us to load a B–52.

Mr. DICKS. How vulnerable is the aircraft today if the B–1 were to be used for conventional bomb missions? In other words, if we had led with the B–1B in Iraq early on, before we had air superiority, would we have suffered significant casualties?

General HAWLEY. We would not have sent the B–1 into downtown Baghdad. It is designed for low-to-medium threat environments.

Mr. DICKS. And the reason for that is because it is not stealthy?

General HAWLEY. It is not stealthy.

Mr. DICKS. Nor does it have electronic countermeasures?

General HAWLEY. Nor does it have the kind of electronic countermeasure system that we would like to have for that environment. It was countermeasured for the strategic mission, which is what it was designed for, and it has not yet been modified to adapt it for the kind of roles we envision today in its conventional role.

B–1B PRECISION-GUIDED MUNITION CAPABILITY

Mr. DICKS. When will the B–1B have a precision-guided munition capability?

General HAWLEY. The first precision weapon for the B–1 will be the JDAM, the Joint Direct Attack Munition, which is an INS and GPS-guided munition. It will have an accuracy in the vicinity of 13 meters, so it will be a very accurate weapon, and it will have that capability at about the turn of the century.

Mr. DICKS. 2001?

General HAWLEY. 2001.

We hope to pull that forward a little bit, but right now we are looking at 2001; yes, sir.

B–1B UPGRADE STRATEGY

Mr. DICKS. Ms. Druyun, what is the Air Force's strategy for upgrading the B–1B bomber and what is the cost and benefit for each upgrade?

Ms. DRUYUN. The overall strategy that we are looking at in terms of the operational bomber itself is basically broken into three phases. The first phase is looking at integration of cluster bombs to give it anti-armor capability, and we are looking at that in the fiscal year 1996 time frame.

The second phase is——

Mr. DICKS. Let me ask you about cluster bombs. Are these considered smart weapons?

Ms. DRUYUN. No. These are not smart weapons.

The second phase of the upgrade is really gathered at smart weapons, weapons such as JDAM, but to do that requires GPS. It also requires Military Standard 1760 to be integrated in the platform.

So we are looking at that, as General Hawley said, more at the turn of the century around 2000, 2001.

The third phase deals with what we term precision weapons. Weapons such as JSOW and TSSAM and that is around the capability early in the next century, around 2003, 2004 time frame.

Mr. DICKS. Is this all affordable? It appears very slow. We have had the B–1B for years, and yet it is going to be another 10 years before we really have a conventional capability on this aircraft. Can this program be done any faster?

General HAWLEY. We think we can pull the JDAM part forward a little bit with some additional investment in the near term, and we are looking hard at that, and we are going to look at ways we might be able to fund that.

We will have to get back to you with reprogramming requests to do that, if we can figure out how to do it.

[The information follows:]

Yes, the B–1 Conventional Mission Upgrade Program (CMUP) is affordable and is currently fully funded in the FYDP. However, additional funding would allow more rapid development and integration of near-precision and precision conventional weapons on the B–1.

The B–1 program is funding driven at this point. The Air Force may request funds in the FY94 Omnibus reprogramming to help accelerate RDT&E so that flight testing may begin as soon as JDAM test articles are produced. Further, with additional funds in the outyears for modifications to the B–1, it would be able to deliver advanced weapons as soon as the weapons roll off the production line at the turn of the century.

Mr. DICKS. You have a fundamental problem, and that is you can't lead with this aircraft. You can lead with the F–117. You can lead with the B–2, but the B–1 and the B–52s are vulnerable to the kind of surface-to-air missiles that even most Third World countries have today; isn't that correct?

General HAWLEY. I guess I wouldn't view them as a problem. I consider them as complementary. We have those stealthy capabilities which can go in and take down the defenses, and then we can complement those with a mass deployment.

Mr. DICKS. You just testified that you couldn't operate those planes without losing an unacceptable number; isn't that correct?

General HAWLEY. Yes, sir, but with your support, we have developed capabilities to take down those defenses and we have demonstrated that we can do that very handily. So we think it makes good mix.

Mr. DICKS. Even with a much smaller Air Force of the future?

General HAWLEY. Against the threats we envision in the Bottom-Up Review, the scenarios we look at, yes sir, we can take down those defense. We are very confident of that.

B–1B ELECTRONIC COUNTERMEASURES

Mr. DICKS. What about the electronic countermeasures? What is the status of this program, defensive countermeasures?

General HAWLEY. The defensive countermeasures, as you know—we were precluded from upgrading the countermeasures until 1996. So our intent is to come forward——

Mr. DICKS. Did Congress preclude you from that?

General HAWLEY. Congress suspended our efforts in that area in the FY94 language, and we intend to come to you with a plan to begin that upgrade to a new configuration in 1996.

Mr. DICKS. How are you planning to do that?

General HAWLEY. We will begin with some concept development work and risk reduction efforts in order to compete different proposals for giving us an effective and affordable ECM system for the airplane.

Ms. DRUYUN. In terms of the competition, we are going to open up and look at a range of alternatives from taking the current ECM system and doing updates to it, allowing other ideas to come in with a totally new ECM-type proposal.

We are going to compete those ideas and try to go out initially with about three or four concept development initiatives and then try to net them down to two and eventually a single contractor, the overall investment that we are looking at making there is about $1.2 billion.

Mr. DICKS. When the aircraft is used as a conventional bomber rather than a strategic nuclear penetrating bomber, is the ECM requirement now more stressful or more relaxed or about the same?

General HAWLEY. I guess I would say both. In some areas, it is more stressful because you tend to encounter a more dense threat environment. In some ways it is less stressful because instead of penetrating as a single aircraft into an environment like the former Soviet Union to do its strategic mission, which is what it was built for, it now will be employed as a part of a package of aircraft with fighter airplanes, with which it is very compatible because of the excellent speed, suppression, defense suppression airplanes, and airplanes that are stealthy like the B–2 and the F–117.

That imposes a different set of requirements, and we need to tailor the system to that environment, and that is exactly what we hope to propose to you and gain your approval for in 1996.

B–1B CRUISE MISSILES

Mr. DICKS. Could you put cruise missiles on the B–1? I understand there is a problem because of the turbulence. Is that a real problem?

General HAWLEY. I think the answer is I don't know. We haven't really done the work that would be required to answer all of those questions.

As you know, we can carry the cruise missile on the B–52. That is one of the reasons——

Mr. DICKS. Why do you want to keep the B–52?

General HAWLEY. The reason that we want to keep it is so we can continue to carry those cruise missiles on the B–52 and let it do that work. It is not designed to go into the medium-threat environment. So it is really ideally suited to that stand-off role where we carry the ACM, let it in from a stand-off distance.

So we think the B–52 is very well suited to that mission and we will leave the B–1 for the mission that we are tailoring it for.

Mr. DICKS. What is that mission?

General HAWLEY. That mission is conventional. It is to deliver both massive quantities of unguided munitions as well as significant quantities of accurate——

PRECISION GUIDED MUNITIONS (PGM)

Mr. DICKS. General Dugan, the General who wrote the articles during Desert Storm/Desert Shield, said dropping dumb bombs doesn't make any sense anymore. What was needed is precision-guided munitions.

Gen. Dugan showed the sortie rates, and compared the capability during World War II, and how it improved in Korea and then in Vietnam, and you get the building one out of forty-five hundred times. You have 4500 flights and one time you hit the building.

By Vietnam or Korea, it is 95 to 1, and then you see what was accomplished with the 117s in the Gulf. It is one for one or two for one.

Why would we want to use dumb bombs when we only have 171 bombers, General?

General HAWLEY. There are a lot of targets that require precision, but there are some targets that don't. I think the Republican Guards in Desert Storm are a good example where we dropped unguided bombs by the ton from B–52s and by all accounts, after the war, it was one of the most effective things we did to debilitate those formations.

Mr. DICKS. You are saying it is less extensive, but you want to retain that capability?

General HAWLEY. I think you need both the capability to do precision and to do mass, because there will be times when you need mass fire power as well as precision.

Mr. DICKS. Wouldn't you be better with mass precision than mass inaccuracy?

General HAWLEY. Sir. I am not going to say we don't need accuracy. We need accuracy, and a B–1.

Mr. DICKS. Especially when you have one hundred seventy bombers left.

General HAWLEY. With individually targetted JDAMs, it is going to be a very potent weapon, but at times, we are going to want to be able to drop those 84 MK–82s and make a whole lot of sound and thunder and break peoples' eardrums like we did with the Republican Guards in order to disable those troops.

It is nice to be able to do both. That combatant commander out there is going to ask us for that. I think that General Luck in Korea, anybody who is going to deploy those airplanes——

Mr. DICKS. How accurate are these dumb bombs, the MK–82s?

General HAWLEY. I can't give you the CEP. I can give you that for the record.

[The information follows:]

The 500 pound MK–82 is classified as a general purpose "dumb" bomb. Therefore, its accuracy is based on delivery aircraft type, dive angle, and release altitude. ———.

Mr. DICKS. Can anybody provide us the CEP on the MK–82? Do you know?

Ms. DRUYUN. No, sir.

I would like to add to what General Hawley had to say about the need for smart weapons. I think it was very clear from Desert Storm that JDAM was one of the programs that very much came to the forefront as a very high-priority for the Air Force to have the capability of taking some of the dumb bombs, the MK–84s, for example, and the ability to put an INS GPS into that and turn it into a smart bomb and be able to get much greater accuracy to at least the 13-meter level.

So JDAM is a very high priority within the Air Force because of lessons learned.

Mr. DICKS. What is the warhead on JDAMs?

General HAWLEY. It is a kit that goes on a 2,000-pound bomb, with the exception of the F–22.

Mr. DICKS. How much will it cost, over the next five years, to fix up the B–1B, in your plan? Is that $2.7 billion?

General HAWLEY. Yes, sir. That includes both convention mission upgrades and the ECM.

Mr. DICKS. Mr. Skeen.

F–117 MODIFICATIONS

Mr. SKEEN. Thank you, Mr. Chairman.

Ms. Druyun and General Hawley, good to have you here. Let me go to the F–117.

I understand that no funds have been requested for any further development on the F–117 as they exist today. At this time you have no plans for any improvement?

General HAWLEY. There is quite an extensive modification program for the F–117.

Mr. SKEEN. In place?

General HAWLEY. Yes sir, for reliability and maintainability in upgrading weapons.

Mr. SKEEN. It is already funded and passed appropriation?

General HAWLEY. Yes, sir.

Ms. DRUYUN. If I could be a little more specific, prior to fiscal year 1994, we have investments of about $770 million in upgrades.

Mr. SKEEN. In the F–117?

Ms. DRUYUN. Yes sir. In fiscal year 1994 we are looking at upgrades that approach about $140 million.

For fiscal year 1995 we are looking at about $65 million worth of additional investments.

Mr. SKEEN. Do any of these improvements encompass the additional bombload?

Ms. DRUYUN. No, sir.

Mr. SKEEN. Why not?

General HAWLEY. I understand that there is a Lockheed proposal to do that. I haven't seen it. There is a proposal to take it from two to four weapons. The user has not been able to rank that modification high enough to get funded. He thinks two bombs are adequate.

The price to double that bombload would be just too high for him.

Mr. SKEEN. So it is a matter of economic planning, then?

General HAWLEY. Yes, sir.

Mr. SKEEN. So you are not ignoring any F–117 upgrades?

General HAWLEY. No, sir.

Mr. SKEEN. They are in process and they are paid for?

General HAWLEY. Yes, sir.

AIRCRAFT UPGRADES

Mr. SKEEN. Do you have any other operational or tactical Air Force aircraft that you are talking about doing any upgrades on—the tactical aircraft, fighters?

General HAWLEY. It is safe to say we have got upgrades going on on all of our airplanes. I can't think of a single airplane we are operating that we don't have plans to upgrade.

Mr. SKEEN. What was the Packard Commission standpoint as far as upgrades on aircraft? I know there was a Packard Commission in the Reagan years.

General HAWLEY. That had to do with acquisition reform.

Ms. DRUYUN. Basically, Packard Commission dealt with acquisition reform and trying to do some rather significant overhaul of the whole acquisition system—streamlining, for example——

Mr. SKEEN. Just the system itself, the way you do your acquisitions?

General HAWLEY. I think there was an element in the Packard Commission that recommended that we buy our aircraft or weapons systems in general with a plan in mind right at the start, that we were going to go through incremental improvements to the weapons system.

Mr. SKEEN. So it was replanning?

General HAWLEY. Yes, sir.

Mr. SKEEN. I wasn't sure what it was——

General HAWLEY. I think that is what you are referring to, yes, sir.

RESEARCH AND DEVELOPMENT LABS

Mr. SKEEN. Let me ask you about the change from aircraft to laboratories for research and development. We are interested in New Mexico, with Phillips Lab and so forth. I think there is $20 million for Phillips Lab. How is the feeling so far as construction of these bases and operations and so forth as to the positions that the labs take in your priority system; the R&D labs?

General HAWLEY. Of course, the R&D labs, as I see them, are the foundation of our S&T effort. Between that and our contracted S&T, that is where we develop the concepts, new technologies that will be incorporated in the Air Force in the future that provide the seed corn, if you will, for our modernization programs.

The Air Force has funded the S&T program at the same level as 1994, so we have sustained growth in our S&T.

Mr. SKEEN. You are holding the level?

General HAWLEY. No decrease, while the Air Force continues to get smaller. What that reflects is a very strong commitment on the part of the Air Force to our S&T programs, to our commitment to that development, the research and development in high technology that really has been the hallmark of our Air Force and that has allowed us to perform so well in so many areas.

RADAR TARGET SCATTER (RATSCAT) SYSTEM

Mr. SKEEN. We have a $3 million improvement on the RATSCAT system. It is involved in the testing on the B–2 program.

Could you comment on that? Can they achieve—am I right in what they have been telling me that they can get up to Mach–10 on that RATSCAT system?

General HAWLEY. I will have to get that for you for the record. [The information follows:]

The Radar Target Scatter (RATSCAT) facility, of the 46th Test Group at Holloman AFB NM, provides the Air Force two premier outdoor radar cross section measurement ranges (main site and RAMS). The RATSCAT Advanced Measurement System (RAMS) is an extremely efficient, secure facility specifically designed for mono-static Radar Cross Section (RCS) measurements. The FY 95 $2.0M investment in upgrades will provide: continued acquisition of a standardized Data Acquisition and Processing System; completion of deficiency corrections for the Integrated Radar Measurement Systems; initiation of phased acquisition for the Bistatic Coherent Measurement System; and, initiation of procurement of the next-generation pylons. All these improvements are imperative to maintain the current capabilities and meet the high technology requirements of future customers, particularly those using very low observables.

The High Speed Test Track (HSTT), also of the 46th Test Group, is capable of hypervelocity testing, with the specific velocity attainable dependent on payload. The HSTT is the designated DoD lead for test tracks and performs rocket sled testing of DoD aircraft ejection systems, explosive warheads, impact and lethality effects, guidance systems, and other tests requiring realistic simulations of acceleration or high velocity environments, including rain and particle erosion. To achieve velocities above Mach 6, a greater than two-foot diameter plastic tube is constructed around the rail, to provide a rarefied atmosphere of helium for the last 5000 to 10,000 feet of sled run. Sled tests at 8500 feet per second, almost Mach 8, have been conducted. It is expected that, with continued technology insertion, testing requirements of Mach 10 will be able to be supported in the future. Programs such as theater missile defense systems require such a capability.

PROGRAM TEST AND EVALUATION

Mr. SKEEN. We have been concerned with the purchase of helium. Air Force officials tell me that you have an envelope that this fast-speed track goes through and the missile penetrates this envelop which gives it a lighter atmosphere and gets their speeds up to Mach–10.

If we do that, we are really moving along.

What I am concerned about is the test and evaluation budget. Some of these programs seem to be at the end of the so-called appropriations food chain. That is why I was asking the questions. I gather that is not necessarily so?

General HAWLEY. I think they are at the front of the food chain. They are the ones that really give birth to the technology that will differentiate our Air Force from the rest of the world in the years ahead.

Mr. SKEEN. I think that is what has put us in the position we are in.

Thank you for your responses.

Thank you, Mr. Chairman.

Mr. DICKS. Mr. Visclosky.

C-17 INVESTMENT PROGRAM STATUS

Mr. VISCLOSKY. Thank you, Mr. Chairman.

I would like to talk about the C-17 for a while. Would you describe your understanding of the status of that investment program?

Ms. DRUYUN. I would be happy to do that.

It is fair to say the C-17 has had just a tremendous amount of developmental problems. I don't think that comes as news to anybody here in the committee.

Today we are about 78 percent complete in terms of our flight testing.

Mr. Deutch spent a considerable amount of time carefully considering the status and health of the C-17 program, and asked the Defense Science Board to take a look at the program and make recommendations back to him. They completed that activity in the December 1993 timeframe.

Basically what they found was that the C-17 itself had a solid design, to use their terms. They also found that with respect to the overall management of the program, that there was a tremendous amount of gridlock in place that was very much impeding progress on the program. They therefore recommended that Mr. Deutch consider as a part of the staff deliberations, what the DSB termed an omnibus settlement to try to wrap up all the claims and allegations and set those aside and let us begin to really focus on the issues relating to the C-17 successfully completing the test program and, more importantly, transitioning much more smoothly than we have in the past in terms of production.

There are still a lot of design changes taking place within the program. That, of course, is very hurtful in terms of trying to stabilize the production and trying to bring the overall cost of the weapon system down.

We are really focused in on the C-17 program and will be for some time to come. At least through the DAB that is scheduled for November of 1995, looking at whether we should buy more than 40 C-17s.

I personally meet, for example, along with the Secretary of the Air Force with McDonnell Douglas to look at our progress on the program and really try to focus in on the key metrics and understand where we are and what resources need to be applied to really turn the corner on that program.

Mr. VISCLOSKY. What was the Air Force's role with Mr. Deutch's office in achieving that settlement and prescribing the details of it?

General HAWLEY. I think I would have to describe our role as minimal. We had very little involvement.

C–17 FLIGHT TEST PROGRAM

Mr. VISCLOSKY. Let me ask you then about the flight test program.

Ms. Druyun indicated it was 75 percent completed. The settlement envisions more testing than I understand the Air Force believes is necessary at this point in time.

How does that extension affect the flight test program?

General HAWLEY. The way the flight test program unfolded, we started out with a contract with an 80-aircraft-month flight test program. It became apparent a year or so ago we needed more testing time. We extended that to 135 aircraft months.

The Defense Science Board looked at the program and said there was more risk than we had made allowance for, and they recommended we have 152 aircraft months. That ended up in the omnibus agreement for cost sharing, from the 80 aircraft months we started with to as much as 152 aircraft months that is in the omnibus.

Mr. DICKS. Will the gentleman yield?

What is an “aircraft month?”

General HAWLEY. Right now we have six airplanes in the test program. If you commit all those airplanes to the test program for a month, that is six airplane months, so you accumulate aircraft months a lot faster than calendar months. That is why we are currently very much on track to complete our DT&E testing this fall.

Originally we were scheduled to complete in March, and if we use the full 152 aircraft months that are provided for in the omnibus, we will complete in June.

So we will complete well before we reach the Milestone Three DAB.

Mr. VISCLOSKY. June of which year?

General HAWLEY. 1995.

Mr. VISCLOSKY. Under the 135 months, when is the flight test program supposed to be concluded?

General HAWLEY. We would finish the program in March of 1995.

Mr. VISCLOSKY. Not December of 1994?

General HAWLEY. That is—combined DT&E/IOT&E will finish on the current schedule in November of 1994, but then we have dedicated IOT&E, Initial Operational Test and Evaluation, which is—the test and evaluation you do to——

Mr. VISCLOSKY. Let me back you up so I don’t get confused. My understanding was that the flight test program that was explained to me was to end in November or December of 1994.

General HAWLEY. That is the portion of the program that we call combined DT&E/IOT&E, Test and Evaluation, and Initial Operational Test and Evaluation.

Mr. VISCLOSKY. Is that what you are referring to as being 78 percent completed?

Ms. DRUYUN. Yes. I am referring to the combined test program as being 78 percent completed.

Mr. VISCLOSKY. What are you talking about?

General HAWLEY. I am talking about both DT&E, which we are on track to finish in November, and then dedicated IOT&E Initial

Operational Test and Evaluation, which we are currently scheduled to finish in March of 1995 under the 135 aircraft-month program.

Mr. VISCLOSKY. Okay.

General HAWLEY. Then with the extension to 152 aircraft months, if we use it all, it would finish in June of 1995, and I think that is where the confusion arises. Some people talk about combined DT&E/IOT&E and others talk about the whole test program, which includes both the combined and the——

Ms. DRUYUN. DT&E is testing conducted with the prime contractor and in this case with the Air Force. When you get into dedicated initial operational test and evaluation, that is testing that is strictly done by the Air Force, there is no contractor participation, and it really is an operational effectiveness and suitability evaluation against the mission need statement to see if it can perform its mission.

C–17 TEST POINTS

Mr. VISCLOSKY. When I was at Edwards last spring and we asked the Air Force to supply us with seven calendar months, a breakdown of the point system that would have to be accomplished during each one of these aircraft——

General HAWLEY. Test points.

Mr. VISCLOSKY. Test points, and we were given total points, approximately 8,000, if I recall. Was that for DT&E or was that for IOT&E?

General HAWLEY. I think they gave you the test points for combined DT&E and IOT&E.

Mr. VISCLOSKY. What are the test points for IOT&E?

General HAWLEY. I will have to submit these for the record. I don't have that total profile with me with all the test points, but I can give you that for the record, compare DT&E and IOT&E.

Mr. VISCLOSKY. Thank you.

[The information follows:]

Dedicated Initial Operational Test and Evaluation (DIOT&E) progress is not measured by completion of specific test points as it is for Developmental Test and Evaluation (DT&E). Twenty-two Operational Test Instruction Sheets (OTIS) provide the DIOT&E framework which is planned to be accomplished in 77 flights using 277.5 flying hours. Each flight is conducted as a complete, operationally realistic mission as opposed to the controlled test environment of DT&E. The OTISs have no individual test points. The OTISs identify the measures of effectiveness (MOE) used to evaluate selected operational capabilities. Tactical operations (low-level flight, formation flight, airdrop and short austere airfield (SAAF) operations) are emphasized over strategic operations because of the greater complexity and stress tactical missions place on aircrews and aircraft. Strategic operations are planned to be evaluated during deployments. Results and assessments of C–17 mission-level measures of utility will be reported in the IOT&E final report.

DEFENSE SCIENCE BOARD C–17 DECISION

Mr. VISCLOSKY. Ms. Druyun, you are talking about completion through IOT&E?

Ms. DRUYUN. No, combined DT&E/IOT&E.

Mr. VISCLOSKY. What was the Air Force's position during the negotiations with the company as to the requirement of the additional 17 months?

When I, again, met with the Air Force personnel and flight test people last year, their message was that they had worked themselves through, I think, the third flight test program. If the term "we can hang our hat on" was used once, it was used twelve times in the course of the conversation. They said this was all that would be needed.

Where did the new 17 months come from?

General HAWLEY. A recommendation from the Defense Science Board, which didn't agree with those doing the test. They thought there was more risk, unknowns, if you will, than those conducting the test were allowing for when they expressed that kind of confidence.

The Defense Science Board, as you know, has a lot of very qualified people with a lot of experience in this area. The Department chose to acknowledge that concern on their part and fold that allowance for some additional test months into the omnibus agreement to make sure that we had an executable program when we implemented this agreement.

And if we don't use them, then there would be—if we went with the current schedule, we would save about $7.6 million of the money that is in the agreement to support the program.

Mr. VISCLOSKY. Whose decision is that?

If you hit March, it is your decision that the Science Board, is it Deutch's——

General HAWLEY. It is our decision. We determine when DT&E is finished and we do that based on the test points.

Ms. DRUYUN. Right now we are at 399 test points ahead of schedule.

Mr. VISCLOSKY. I don't have a problem with that. Is the additional 17 for IOT&E or is it for DT&E or is it for both?

General HAWLEY. Both. It would fund the difference between the original contracted 80-aircraft-month program and the DSB-recommended 152-aircraft-month program.

C–17 COST SETTLEMENT

Mr. VISCLOSKY. You mentioned 80 months twice. The recommendation was to increase it from 135 to 152 months. There is a $123 million, as I understand, settlement.

You are saying the $123 million, half of which we have to absorb from the Federal Government, is the differential between the original 80 months and the 152?

General HAWLEY. That is right.

Mr. VISCLOSKY. Not the 135 and the 152?

General HAWLEY. That is correct.

Mr. VISCLOSKY. Can I suppose, then, part of this is just a payment to the company to subsidize costs they have incurred to date in the testing program?

General HAWLEY. I think it reflects part of the discussion, as the omnibus agreement was concluded. There is disagreement between the company and the Air Force as to who caused the delays in the program, just as there are many other claims back and forth as to who caused some of the problems in this program.

Recognizing those conflicting views, why the program is going to require more testing, it was decided to split the cost and attribute essentially the cause for the slip 50–50, between the Air Force and McDonnell Douglas.

Mr. VISCLOSKY. So for the sake of argument, if at some point you reach a position in March where there is a consensus you need no additional testing, it is not necessarily a savings of $123 million because a lot of that would have been——

General HAWLEY. That is right.

Mr. VISCLOSKY [continuing]. Back payments for the——

General HAWYLEY. Our current estimate is the difference between the 135-aircraft-month program and the 152-aircraft-month program is about $7.6 million.

Ms. DRUYUN. It is important to point out the way we will contractually implement this is we will put it on a 135-aircraft-month schedule and in addition to that, we will have one-month aircraft options that would lead you up to a total of 152 aircraft-months, so the government will have the ability, if it only takes, say, 138 or 140 aircraft-months, we will price it so that we will not get back into any sort of argument as to what is the amount of money to give back to the government.

We are not going to put 152 aircraft-months on contract. We will put the 135 aircraft-months on contract plus individual-priced options and exercise them accordingly.

Mr. VISCLOSKY. On this issue, there will be additional questions for the record. I will just ask one more in my time.

HORIZONTAL TAIL OVERLOAD TEST

I understand that in January, during a flight test, there was an experience of a horizontal tail overload.

Could you explain the circumstances for that and what the cost implications are?

General HAWLEY. Yes, sir.

This was a test to stress the horizontal tail to 100 percent of its design load factor. They configured the airplane with a fairly unusual CG, center of gravity configuration. They established test conditions and they gradually worked towards it. They pulled the stick back to get to 1.8 G's, and did a few of those maneuvers, just to make sure they understood the test environment and the reaction of the airplane.

On the final test, what the pilots were instructed to do was to bring the stick all the way back to the stop, hold it in half a second, then bring it forward smoothly to the center in half a second.

Now, in a big airplane, there is a lot of lag between the time you make a control input and the time that something happens. So essentially they have brought the stick back, put the stick forward, and then the airplane reacts.

It went beyond what the engineers thought it would do. It put 2.3 G's on the airplane instead of 2 G's, and overstressed the tail well beyond the 100 percent design load factor.

There is no apparent damage to the tail. In that sense, this is a good news story because the tail withstood pretty severe stress with no damage, but because it had been stressed beyond its 100 percent design factor, we will remove the tail, take it to non-destructive inspection, see if there was any damage, and replace it with a tail off of one of the production line and replace that production line tail later.

If the tail is of no value to us, if it turns out it can't be used, this is going to cost us $11 million for a new horizontal stab plus the cost to install it.

If the tail turns out to indeed be a good tail, the cost will be insignificant.

Mr. VISCLOSKY. Thank you, Mr. Chairman.

Mr. DICKS. How much of the $170 million in your budget request will be used to settle the problem?

Ms. DRUYUN. $61.5 million of that will be used to pay for the flight test extension. $97 million will be used to pay for claims. The remaining $12 million is a variety of miscellaneous items. That is what adds up to the $170 million.

TOTAL C–17 PROBLEM COSTS

Mr. DICKS. Do we have dollar figures on all of the problems on C–17 at this point?

General HAWLEY. I think it is fair to say no. As we have uncovered things in the test program that we are still working on, I think it is safe to say as we proceed with the test program we will identify others.

Mr. DICKS. In your judgment, are the major issues at his point, General?

General HAWLEY. Major issue is price, I think. I don't think there are any real showstoppers, technically, things that we need to fix. There are things we need to fix, but they are not major technical problems.

C–17 AIRDROPPING LOAD SYSTEM

Currently, we have an issue involving the system for airdropping loads, which isn't working quite as we want it to, so we are having to do some re-engineering with it. That was identified during he flight test program. That is the kind of thing you uncover, and it is being re-engineered. But it is not a showstopper.

I don't think we have any technical showstoppers right now for this airplane. There are some normal engineering changes that will occur as we go through the test program. But the big ones, the wing, as you are very well aware, was a potential major problem. We have got that fixed and identified. We have had the evaluation team look at that and report to the Secretary of Defense on that issue. And everybody is satisfied that we have a good fix and the airplane is performing well.

So I think the major issue here is cost and getting the contractor to get it down. Cost and producibility, they are part of that same equation that we need to continue to work with the contractor on.

Mr. DICKS. Does the company have in place the manufacturing capability to produce this airplane?

Ms. DRUYUN. I think clearly they do have in place the manufacturing capability. The real issue is how we take and implement improvements to that facility so we can really begin to bring down the cost of the aircraft.

CAD/CAM COSTS

Mr. DICKS. I understand that we are paying in this settlement now. We are paying part of the cost to upgrade their facility. Is this accurate?

General HAWLEY. I think it is fair to say that a portion of the cost really is quite small. It is in the area of what I term CAD/CAM and management information system and going to the next quality system.

CAD/CAM management information system and the advanced quality system is about $37.5 million. We are going to make that investment. I believe it is the belief of the Defense Science Board that that investment will more than pay for itself in terms of yielding a good learning curve which will result in reductions eventually in the price of the aircraft.

Mr. DICKS. Doesn't industry normally invest in this on their own?

Ms. DRUYUN. With respect to something like an advance quality system, that normally is an overhead cost that would go into a contractor's overhead pool. The same thing is also true of facilities such as CAD/CAM capabilities. Normally, that is something that is in a contractor's overhead pool that is allocated to the work that is in that given factory.

Mr. DICKS. Is this amount being matched by McDonell Douglas?

Ms. DRUYUN. Yes, it is. They are going to be investing $37.5 million as well.

Mr. DICKS. Mr. Darden.

Mr. DARDEN. Thank you, Mr. Chairman.

Ms. Druyun, I understand from the Chairman's introduction that you are subject to Senate confirmation. Is that right?

Ms. DRUYUN. No, sir. My permanent position is Deputy Assistant Secretary for Acquisition. Mr. Fiester was nominated this past Monday or Friday to be the Assistant Secretary for Acquisition. We are hoping he will be confirmed sometime this April. I am the Deputy Assistant Secretary for Acquisition.

Mr. DICKS. She has done a very good job, I think, in filling in.

Ms. DRUYUN. Thank you.

JOINT ADVANCED STRIKE TECHNOLOGY (JAST) PROGRAM

Mr. DARDEN. I am very interested in JAST, and it seems to me for a $2 billion program the Air Force only gets $101 million out of it for aircraft technical research. Don't you think that is not a very effective way of conducting technical aircraft research if they only give you $101 million out of a $2 billion program?

Ms. DRUYUN. No, sir. Both the Air Force and the Navy are making an equal investment in the JAST program. I think this year each of us for fiscal year 1995 are looking at—is it a $100 million investment?

General HAWLEY. About $100 million apiece this year in order to get the program started.

Of course, this will be a joint program, managed by a joint program director who will work this on behalf of both the Air Force and the Navy as well as the Marine Corps, hopefully, in order to produce the technology which we, the Air Force, desperately need to deliver an affordable replacement for our multi-role fighter in the vicinity of 2010. That is what we hope JAST will produce in the next 15 or 16 years.

Mr. DARDEN. And this is to replace what aircraft, then?

General HAWLEY. For the Air Force we are looking for replacement for the F–16. We need an affordable, relatively low-cost airplane to replace that very large segment of our fighter force, which the F–16 fills today.

Of our 20 wings, 12 of those are F–16 wings. So, in order to fill that 20-wing force structure that the Bottom-Up Review says we will have to support our country's strategy, we need a lot of airplanes.

If we are going to buy a lot of airplanes beginning in the vicinity of 2010 they are going to have to be affordable. So we need an F–16 replacement, and we need it to be an affordable airplane to do that.

F–22

Mr. DARDEN. You don't look at the F–22 as an affordable replacement?

General HAWLEY. We don't think that the F–22 can be procured in the quantities it would take to fill that. And, of course, it is not really designed to do that multi-role mission. It is our high-end fighter, to provide that air superiority that we have to guarantee the commander out there in whatever scrape he might get into.

Mr. DARDEN. We have—and, Ms. Druyun, I am not sure whether this should be addressed to you or General Hawley—but whoever is comfortable can answer the question, if you will just volunteer. Last year, this subcommittee—and the House followed our recommendation—fully funded the F–22. Then we lost about $325 million in the Senate version. Then we compromised on about half of that at the final level. And we start off this year, I believe, with a request for roughly $2.4 billion.

And with a program as large as the F–22, there is quite a bit of temptation on behalf of the Congress that, since the program is so large anyway, you must ensure there be room for reductions. And with a program this expensive—or at least an appropriation this large—there is a great temptation—and we also face the possibility of the same thing happening this year.

And we need to be able to make a case for the full funding for the F–22 or the same thing will happen in this coming year as happened this past year.

We have received from the contractor, of course, some concern about it, but, at the same time, I assume the Air Force is fully committed to full funding as its number one priority.

Ms. DRUYUN. That is correct. It is our number one priority. We believe it is absolutely essential that the Congress this year appropriate the full amount of money that we have requested.

FUNDING F–22

Mr. DARDEN. Could you briefly outline, then, as you probably are about to do, the case for full funding and the consequences if we don't? Because we really have a problem in this area when we start nicking away. And we have trouble convincing our colleagues of the importance of funding the program entirely rather than what appear to be small reductions.

Ms. DRUYUN. I think, sir, as you are aware, we want the F–22 program. We completed preliminary design review just about a year ago. We are looking at critical design review, which is, I think, one of the keystones in this program, in the design portion, as it is scheduled to occur in approximately one year.

We have, as you know, a tremendous amount of resources devoted on the part of the contractor as well as on the part of the Government to complete all of the detail design necessary to get that system-level critical design review completed in 1995.

I personally spend a tremendous amount of time on this program because it is the Air Force's number one priority, and because it is a cost-type contract. Every time we take a dollar out of this program it really costs us more than a dollar to restore that later on.

And there are a variety of reasons. One is inflation. But, more importantly, the whole contractor's design force, as you are moving toward an end point, in this case the end point is critical design review. This is when you have the greatest number of design engineers, systems engineers working and setting in place the finite design before we begin actually bending the metal.

Just looking at the reduction that was made in fiscal year 1994, for example, of $163 million, I believe it is our estimate, that bumps up the EMD cost probably anywhere from $400 to $600 million. But it forces us to go back and to replan that which we have done to take and stretch the work out, to lose leverage with the contractor's ability in terms of his productivity.

And, more importantly, it eats away at the little bit of management reserve that we have in that program. And management reserve is absolutely essential for us to have, if we are going to effectively make a cost-type contract. And one really—in this case, that is pushing the state of the art.

F–22 SHORTFALLS

I think the committee is well aware of the fact—and we have, for example, identified some shortfalls in the radar cross section (RCS), and we are using part of that and will be using part of that management reserve to solve the RCS shortfalls that we have.

And we also are in the process, for example, right now of redesigning the engine turbine because of vibration problems that would affect the long-term durability. And, unfortunately, some folks have expressed to me in the past that, you know—I don't need, for example, $200 million in management reserve. As they did in fiscal year 1994, you could remove $163 million and still think I could effectively manage a program.

We cannnot. I cannot ask the program director to be responsible for something if I take all of his tools away from him.

We recognize that there will be some unknown unknowns that will occur as we go through this high-tech development. And he needs the funds to be able to effectively manage that program. What happened in fiscal year 1994 with the $163 million reduction that we had? It basically has forced us to move the dates that we originally had set for CDR. It has caused us to go through yet another replan of the program and to get yet another proposal from the contractor and have to renegotiate a large portion of that contract.

And it is just a very, very expensive process that in the long term costs all of us money.

In terms of best value, the plea I have with you is to appropriate the full amount of money that we have requested for this program. It is a model program. We have worked hard to make this a model program.

We are 22 percent complete in terms of where we are in the cost performance data. I look at that every single month.

When I look where we are at cost and schedule, I am within 1 percent of what my estimate was. For a program that is this high tech, I think that is just an excellent example of how a program can be managed if you give us the right resources to do it with.

ROLE OF THE F–22

Mr. DICKS. Tell us again, General, why do we need this aircraft?

General HAWLEY. The F–22 will be our front-line air superiority fighter. It will provide air superiority over battlefields, the rear area, and over the enemy's O-Club, if you will. It will enable every other weapon system we need to bring to bear to fight this country's battles. It enables all the other airplanes that have to do their work. It enables the ground forces—because it keeps enemy aircraft from attacking them. It enables our interdiction aircraft like our bomber force so that they can operate free of the threat of being shot down.

It allows us to control the air so that we can fly forces safely into the ports and air fields we need to deploy them into when we have to respond to a crisis. It is the first thing that every commander asks us to do when we get into trouble, is to establish and maintain air superiority.

That is what F–22 will provide for us in the next century.

Mr. DICKS. Where does JAST fit in?

General HAWLEY. JAST will provide a replacement, basically, for the F–16. We hope that it will incorporate some steathy features so that we won't have to worrry so much about suppressing enemy defenses. Its job will be that of attack bomber for both the Air Force and the Navy, that will haul iron in and destroy targets with precision, with stealth, so they can get that part of the job done.

But it won't be an air superiority fighter.

Mr. DICKS. And you are going to also use the F–22 for attack?

General HAWLEY. F–22 will have some attack capability. We have incorporated the capability to deliver a 1,000-pound bomb, two 1,000-pound bombs, which will be carried internally, so there is no compromise in its stealth characteristics, which will be equipped with a JDAM guidance kit. So it will be accurate and be able to complement our other systems.

It won't be its primary job, but if the occasion arises, as it did in Iraq during Desert Storm where we established air superiority fairly quickly and were able to maintain it without committing our entire air superiority force, then it gives the commander the flexibility to divert some of that force to do some of the attack job that airplanes like the F–117 might be doing—or the F–15E.

F–22 RADAR CROSS SECTION (RCS)

Mr. DARDEN. The final question I wanted to bring up, Mr. Chairman, you mentioned this, Ms. Druyun, is the problem with the RCS shortfall. How serious is this in the scheme of things? Is it something that can be really fixed or is it a problem that we will continue to have throughout the development of the aircraft? On a scale of one to ten, how serious it is?

General HAWLEY. It is a serious problem because it affects one of the most important characteristics of this airplane.

The three things that this airplane will bring to us that are unique and advanced are stealth, super cruise and integrated avionics.

We have formed a red team to examine this problem, which consists of all of the best experts there are, both in the Air Force and in industry, to come up with solutions. They are working very hard. They have determined that the basic shape of the airplane is sound.

It is not a problem with the shape of the airplane. As the design grew, as engineers all over this program did their thing, they built in a lot of little cracks and drain holes, made panels that opened for easy access for the maintainer, and so on. All of which, when we finally were able to apply a new model that Lockheed has developed to assess the impact of these kinds of changes on the RCS, we figured out that we have got a problem, that all these little things that had been built into the airplace were decreasing the stealth characteristic.

We caught it at exactly the right time. We are now at the point where we are refining that final design as we go towards critical design review.

So, again, I call this a good news story. We have got the tools in hand, applied them at the right time, identified the problem. We have got the best people working to identify a fix. And in early April we will be able to come to the Congress and describe how we plan to fix this program and exactly what the cost of that fix will be.

As Ms. Druyun pointed out, this is the kind of thing that consumes management reserve and it highlights why it is so important to fully fund this program so our program managers can have the tools they need to fix these kind of development problems, which are normal in any development program, particularly when you are pushing the technology as we do with the F–22.

Mr. DARDEN. Thank you very much.

Thank you, Mr. Chairman.

Mr. DICKS. Mr. Lewis.

HYPERSONICS SYSTEMS TECHNOLOGY PROGRAM

Mr. LEWIS. Thank you, Mr. Chairman.

The Air Force is requesting $45 million for hypersonic flight technology—essentially to continue some components of the NASP program. Could you explain that technology?

Ms. DRUYUN. HySTP is the name of the new program, Hypersonic Systems Technology Program. Basically, what we are looking at is a technology program that we would jointly work with

NASA. The original goal of the program is to demonstrate the performance and operability of a SCRAMJET–RAMJET type engine at very high Mach numbers.

We are looking at 12 to 15 Mach, which, is we are able to achieve that, has tremendous capabilities in terms of war fighting capabilities well into the 21st century.

We have tried to design a program—we are looking at basically using four vehicles, kind of one-third to scale. They are suborbital vehicles, Minuteman or Peacekeeper vehicles.

We are hopeful we can demonstrate the Mach 12 to 15 maximum range, maximum capability, and we believe that once we are successful in doing that, then it will have tremendous payoffs to the Air Force as well as to NASA in terms of its space launch capability and of technology that can be rolled into future weapon systems as we take and develop them.

Mr. LEWIS. Would you elaborate more, on NASA's possible benefit from this or the impact it might have on the private sector.

Ms. DRUYUN. NASA's benefit is something I would refer to as a single-stage-to-orbit, being able to get something up very, very quickly, very fast. NASA—the way we have, basically, split the program between NASA and the Air Force, it is kind of an investment. For every $2 we put in, NASA will put in $1. And we are, frankly, very excited about the program.

Mr. LEWIS. Describe for me NASA's participation in a budget sense.

Ms. DRUYUN. For fiscal year 1995, the Air Force has proposed $45 million, and NASA is going to put in $22.5 million. And then, after that, it is—I think it is $90 million a year through the FYDP, the investment we are looking at making in this program.

Mr. LEWIS. Last year, we had a reasonable amount of discussion about the prospects or the thought of transferring the NASP program to the Defense side because of the dollar squeeze and the lack of priority given within NASA. That continues to be of concern to me. What do you think we give up by not building a flight test aircraft?

General HAWLEY. The most important part of an advanced effort like this is the engine technology, propulsion. That is why we focused on that. We have done an awful lot of work in materials and flight control dynamics to date.

But trying to do a SCRAMJET, trying to get a hypersonic-capable engine seems to be the most difficult technological hurdle to get past.

I think if we can demonstrate its producibility we will be in a position to some to the Congress and ask for the funding to support translation of that technology into a vehicle. And I think that we have the time to do that. This is a very advanced technology. We are looking a long way in the future to apply it.

So we have the luxury of time now in order to approach this in a deliberate way, get the motor done first. Once we have the proposed technology in hand, we can put it into a vehicle.

Mr. LEWIS. I would certainly urge that as you look to the long range, you not count upon NASA's high-priority participation. And if, indeed, you are counting on it, this Member would like to know so I can have some direct communication regarding it.

Last year, we made some effort to move NASP out of NASA or that subcommittee to this subcommittee. The Senate said, absolutely forget it. Has the SCRAMJET sold well on the Senate side? Do you have problems there?

General Hawley. Sir, I can't speak to that. We are going to have to get back to you and tell you what is being done in terms of opportunities to testify on that subject.

[The information follows:]

The Air Force and NASA have jointly structured a hypersonic technology program that is focused on addressing critical technology needs. The SCRAMJET is one of the technologies that is part of the new hypersonic technology program. We do not have any indication that the Senate has a major problem with developing SCRAMJET technology.

Mr. Lewis. Maybe you had better make sure they know what HySTP is before you get there, because you might not get there.

Ms. Druyun. Mr. Goldin earlier in February testified on HySTP before the Science and Technology Committee and was a very strong supporter of it.

Mr. Dicks. To do the engine development?

Ms. Druyun. Yes.

Mr. Dicks. I am advised that it is not technically possible to do NASP. Is this what we found out in this development program?

Mr. Lewis. You mean to build an aircraft?

Mr. Dicks. I'm told it cannot be done, that the options we were looking at before were not technically achievable. Is this true?

General Hawley. I don't think that is where our technologists would come down on the issue.

Ms. Druyun. I think it was more of a question of affordability.

General Hawley. We can't afford to chase this technology as vigorously as we hoped.

Mr. Dicks. Mr. Reagan said it is doable. But, people who I trust, and who build these airplanes have told me in their judgment it was not doable. They suggest alternative ways, but it was not doable the way we were trying to do it.

Mr. Lewis. They are taking the SCRAMJET. They want to move that to Mach 12 to 15, maximum. Then they want to build an aircraft around it.

Mr. Dicks. I commend you for what you are doing here. I think scaling this thing back to a more reasonable size is very wise—especially in a time of tougher priority decisions. We have got a lot of other programs. This is a good effort, but it is the right size, in my view.

Mr. Lewis. Mr. Chairman, I am going to listen with interest to your pursuing of the B–2. Are you going to pursue that soon?

TRI-SERVICE STANDOFF ATTACK MISSILE (TSSAM)

Mr. Dicks. We are not. We are going to have our own bomber hearing. But I will ask them some questions about TSSAM, if you would like to listen to me pursue that for a few minutes.

Mr. Visclosky.

Mr. Visclosky. I would like to talk about the TSSAM program. I have heard that your Chief of Staff said, at a certain point—if it is not performing, we will not buy it—End quote.

Ms. DRUYUN. We continue to have problems with the TSSAM program.

Mr. VISCLOSKY. This is the line the Chair wanted to pursue. Mr. Lewis.

B–2 PROGRAM

Mr. LEWIS. In the meantime, what is the status of the B–2 flight test program?

Ms. DRUYUN. I think the status of the program is that it is really, I think, proceeding fairly smoothly. In terms of DT&E, we are about 35 percent complete. We have done some limited IOT&E. We did that on the Block 10 aircraft. We accepted the first aircraft in December at Whiteman Air Force Base. So far, the program of flight test is really proceeding very well on schedule.

We are not having problems with the aircraft itself nor with the avionics or the software. So I think at this point in time we are quite pleased with the progress we are making.

Mr. LEWIS. Would you provide us for the record the amount that has been spent yearly on B–2 R&D ECOs during each of the past few years?

General HAWLEY. Yes, sir.

[The information follows:]

Air Force programs typically do not individually track outlays/expenditures for engineering change orders (ECOs). In the case of the B–2, the contractual accounting system rolls all R&D spending into the major system components (e.g., avionics, airframe, etc.). Therefore, outlays/expenditures for individual ECOs are not administratively tracked. At congressional request, we began budgeting for ECOs as a separate item starting in FY94. When an ECO is required, however, the funds lose their specific ECO identity since they are allocated to a particular contract task at that point. The ECO budget for FY94 and FY95 is as follows:

Fiscal year:	*Millions*
1994	$55.0
1995	22.7

B–2 SIMULATOR CONTRACT

Mr. LEWIS. They tell me the simulator contract is $250 million over its target cost of $323 million, a 77 percent cost increase, I gather. What is the problem with the simulator?

Ms. DRUYUN. I think at this point in time I would have have to take that one for the record. I have looked recently at the SAR report, and it was difficult for me to ascertain exactly what the problem was. It really could be a number of things. I don't know if this is a reflection of the fact that the role of the mission of the B–2 changed, which, of course, would have a dramatic impact on the ground-based training simulator. I don't know if that is the reason, but I will be happy to supply that for the record.

[The information follows:]

The referenced $250M difference between the current target price and the original estimated price at completion represents an actual cost increase, based on the Dec 92 Selected Acquisition Report. This increase portrays the government's best estimate of current and forecasted adjustments to complete the cost reimbursable development contract in 1994. This overall projected increase in the estimated price at completion is due primarily to the stretch-out of the B–2 program. Other factors contributing to the increase are: delivering the first simulator approximately four years after the target date, adding work content to the simulator by transitioning to the block upgrade program for the actual aircraft, and incorporating changes into the highly complex B–2 Aircrew Training Devices (ATDs).

The development of the B–2 ATDs is currently about 98% complete, and the issues which led to the cost overrun are well behind us. In fact, the projected price has actually decreased by about $44M subsequent to implementation of the block acquisition approach in August 1991. Nearly $10M of this cost avoidance is attributable to contractor underrun, and over $15M is attributable to a joint government/contractor cost reduction initiative. The balance is from credit changes initiated by the government.

The ATDs are the most complex simulators built to date. They are intended to be full mission rehearsal devices, not just aircraft simulators. They are the first to make major use of Ada, the DoD standard programming language, and require in excess of ten times the throughput and memory of their B–52 predecessors.

B–2 CONTRACT COST GROWTH

Mr. LEWIS. The latest Selected Acquisition Report to Congress shows that the B–2 contract submitted by the Air Force was estimated to be $9.1 billion beyond the contract target cost of $11.1 billion, an 82 percent cost growth. How much of this is due to Government change and how much is considered to be overrun? Do you have that stuff before you?

General HAWLEY. I think the key point here is that we capped this program. Congress directed us to cap our expenditures on the B–2 at $28.968 billion. And we are going to stay within that cap.

Our sense is that that is the agreement we have with the Congress. That is how much we can spend and no more. We are convinced we can do that.

Ms. DRUYUN. Back in the August, September time frame, when it was clear to me there was going to be a cap imposed on the program, I asked for what I term an independent executability review, i.e., did I have sufficient funds on contract to finish the program as we have laid it out to the Congress?

What the team reported back to me is that we do have adequate funds, and we believe that, while it is tight, that we definitely will be able to bring this program under the cap that has been imposed.

The other thing that I look at on a monthly basis is the cost performance reports. And I think, in looking at the cost performance reports, if you were to go back and look at them for the past year—and that is as far back as I have done—in terms of where we are with this cost and the schedule, we are right on target.

I think that the tremendous cost coverruns that we experienced in the past are just that. They are in the past. When you look at where we are today, and you look at the trends we see today, I think that cost, schedule and performance are very much under control and are being very well-managed by Northrup.

Mr. LEWIS. No small reason for our scheduling the bomber hearings ahead of us comes from some of the dialogue that took place on the trip of this subcommittee to Korea. We were talking about what happens if we have more than one major conflict in different parts of the world and the roles that might be played by bomber forces, the B–1B, conventional capability, when it will be available to us, what jumping a generation might mean, discussions of the feasibility of at least keeping this line open.

That is a piece of my concern and interest here, as well as at a later hearing.

One of the questions provided by the committee says, what funds are included in the fiscal year 1995 B–2 R&D budget for other than flight test? And why?

Ms. DRUYUN. I am not sure if the question is do we have upgrades planned for B–2 in the budget? And I would have to say, basically, the funds laid out, as best I understand them for the RDT&E, is to complete the program to go from the Block 10, which is, basically, what I would term an initial capability for the aircraft, to a Block 20 capability, where we begin to have the ability to integrate smart weapons into it and then, finally, to a Block 30 configuration which is 1998.

General HAWLEY. 1997. The last two airplanes will be in the Block 30 configuration. We will be upgrading all the airplanes to the Block 30 configuration. It is essentially flight test, the incorporation of smart weapons capability in the aircraft and the RDT&E for the block upgrade from Block 10 to both Block 20 and Block 30.

Ms. DRUYUN. But they are they are all part of the B–2 baseline and, as such, that is not additional work that is planned.

General HAWLEY. And it is within the cap.

Mr. LEWIS. Any input you want to provide?

B–2 GLOBAL POSITIONING SATELLITE (GPS) TARGETING SYSTEM/GPS AIDED MUNITIONS (GATS/GAM)

Mr. DICKS. Can you give us in update of the status on putting GATS/GAM on the B–2?

Ms. DRUYUN. I checked on that last week based on the conversation we had, sir, and that is moving right on target. Northrup is exactly where we expect them to be. We see no problems with the GATS demonstration, including the drop of the 28 GAMs.

JOINT DIRECT ATTACK MUNITION STATUS

Mr. DICKS. How are we going on the JDAMs?

Ms. DRUYUN. JDAM I think is going to be another good news story. I issued the request for the best and finals yesterday, and I expect to make a decision on the source—the two sources to begin the JDAM work around the 10th of April. So that is proceeding very well, and I am just extremely pleased with the horse race that we have going.

Mr. DICKS. On the JDAM?

Ms. DRUYUN. On the JDAM, yes, sir.

Mr. DICKS. So it sounds like we have something that is going well. My concern, as you know, was if there was going to be a delay, if JDAM wasn't staying on track, that we would want to pursue the procurements of the 128 GAMs. Is there any timing difficulties here?

General HAWLEY. We are protecting out capability to do just that. If we encounter delays in the JDAM, we have protected our ability to procure the additional GAMs.

Mr. DICKS. In order to have the initial——

General HAWLEY. So that we have the initial capability yes, sir.

GAMS V. JDAMS

Mr. DICKS. Is there any difference between the capability on the GAMs and on the JDAMs?

General HAWLEY. Yes, sir. The JDAM, number one, will be a lot cheaper. It will also be more accurate.

Mr. DICKS. JDAM will be cheaper?

Ms. DRUYUN. Yes, significantly cheaper, yes, sir.

Mr. DICKS. Initially, would it be cheaper on the first 50 JDAMs?

Ms. DRUYUN. Yes, sir. And I will be happy, when I am through with the source selection, to come share that information with you.

Mr. DICKS. All right.

BOMBER FUNDING

Mr. LEWIS. As you are going hand in hand, cooperating with the committee and responding to these questions, there was a line there relative to our future hearing which involved some of the pros and cons of keeping a line open. Anything you might add for the record to that that might be helpful, I would be interested in.

General HAWLEY. Yes, sir.

[The information follows:]

The vast majority of the $408.5M of B–2 R&D funding in the FY95 President's Budget (PB) supports continuation of Engineering and Manufacturing Development (EMD) and flight testing. Approximately $147.9M is budgeted for actual flight test activities. Of the remaining budget, $145.3M is for continued engineering and design efforts, $51.2M for support equipment, data, and training, $30.0M for Engineering Change Orders, and $34.1M for other activities.

The Engineering Change Order budgets in FY94 and FY95 incorporate some of the final configuration changes into the flight test aircraft to allow verification changes into the flight test aircraft to allow verification of the changes. This will provide an opportunity to evaluate the procedures to be used during the modification of operational aircraft to the final baseline configuration called "Block 30." The first two operational Block 30 B–2s will be delivered to the Air Force in FY 98 directly from the assembly line. The remaining 18 B–2s will be upgraded to the Block 30 configuration by the end of FY2000.

Regarding the continuation of the B–2 production line, the use of B–2 manufacturing facilities for depot work would allow for the retention of some design and manufacturing staff and equipment, but not enough to preserve the bomber industrial base. For instance, this course of action does not keep the supplier base intact. To do that would require the actual production of additional B–2s, which the Air Force does not currently support due to budget constraints.

TSSAM FLIGHT TEST PROBLEMS

Mr. DICKS. Let's talk about TSSAM. TSSAM, as we all know, has been a very troubled program. That may be the understatement of the year. During the past six months, it has been perhaps at a new low point with a series of unsuccessful flight tests. The fiscal year 1995 budget requests $607 million for TSSAM, of which $230 million is for R&D.

As has been the case since fiscal year 1988, the ever optimistic Air Force continues to assert that the program is now ready for production.

Ms. Druyun, please explain the recent flight test failures and their cause. As I understand, this last flight test failure was a pretty minor problem, and the question I have is whether we going to kind of scrap the whole program, or do we allow the next couple flight tests and delay this for another year? I believe that we should not do any more tests, but do see if the Air Force can turn this program around and then if they fail, then delay the thing for a year.

It seems to me to pull the plug early would be a mistake.

General HAWLEY. Ms. Druyun is truly an expert on this, but I can't resist saying that what we are trying to do is keep this program from committing suicide.

Mr. DICKS. This program has committed suicide every year.

General HAWLEY. This program has been standing on the bridge ready to jump off.

Mr. DICKS. The Senate Committee continues to raise this program from the dead.

General HAWLEY. We see this program trying to commit suicide and we are trying to keep it from doing that, so we want to intervene and make it succeed. We need this weapon. Nobody wants to bring this program on-line more than we do, Ms. Druyun and I.

Ms. DRUYUN. Sir, if I could just kind of walk you through some of the recent activities. I would like to say in my personal opinion, and I have spent a lot of time over the last six weeks with an in-depth review of this program, and my opinion is that the program continues to have problems, but it is salvageable.

I am not here to tell you that we have turned the corner, because we have not. The program very much emulates the problems that I saw with AMRAAM in the 1988–1989 time frame. I believe that it is basically a good design. I think that our confidence with respect to design has really grown over the flight tests. When you look at the last three failures that we have had, those basically have been quality or process problems, and so the problems that we are experiencing are like AMRAAMs, are quality.

You know, this is done under the old way we used to do business called full-scale development where we really didn't spend a lot of time working on the manufacturing quality issues, we spent more time on working on trying to get the design right. I have to tell you having talked to General Loh that he is a strong supporter of this weapon system, as a matter of fact I term it the corner stone of his road map in terms of stand-off weapons.

Looking at the last three failures, the one that we had in June was an Army launch, basically a vertical tail fin didn't lock into position, and it is kind of interesting, there was nothing wrong with this little item. Northrop had basically redesigned it to try to make it more producible, but in redesigning it, they really didn't go out and do adequate testing of it.

So what I am seeing right now is that they are trying to make us a much more producible weapon that they are putting through design changes and it is not because there is something wrong with the design, it is because they are trying to make it more producible, but we are not doing an adequate testing.

When I look——

FIXED PRICE RESEARCH AND DEVELOPMENT CONTRACTS

Mr. DICKS. And the reason is because of the crazy contracts that we have. That is why they are not doing it, because of these firm fixed price R&D contracts.

Ms. DRUYUN. Well, that is correct, sir.

Mr. DICKS. That is the legacy of the previous administration.

Ms. DRUYUN. Well, but in this case, this one has an interesting history behind it. The Congress directed us to write a fixed price development contract and that was back in the 1985 time frame.

That is—I can tell you that is clearly the case. I have—it appeared in the authorization and appropriation bill directing us to write a fixed price contract.

Northrop's estimate at completion shows Northrop making an investment, I would say outwards of close to $800 million of their own money. When I look at the investment that their subs have made over the ceiling price of the contract, it is probably close to $300 million.

We are looking at contractors having reached into their pockets to the tune of about $1.1 billion on this program. I personally talked to Kent Kressa; I am meeting with him on the 24th of March. Mr. Kressa tells me he is committed to making this program a reality. I have right now what I term an independent review team looking at flight readiness. I don't want to have another flight and another failure, I can't stand that. So basically I have asked a special team to go in and look at all of the steps that the contractor goes through, as well as the government, in preparing us to make a decision whether or not we are ready to actually do a launch.

That team is going to be getting back to me in the next week to report their findings to me.

Mr. DICKS. All you have to do is give the company another $75 to $100 million. But you know, at some point, you are going to break the goose that keeps having to pay for all of this. That is why these contracts are so bad, because it puts you into an adversarial position.

I fight these things every step of the way, because of this and now, from what you are telling me that this program may be delayed for another year, and it is going to cost another hundred million bucks.

Ms. DRUYUN. Let me say this, sir. I have not made a final decision there.

Mr. DICKS. I didn't know that.

Ms. DRUYUN. I am looking at a variety of alternatives. I can say this, though. The long lead that was scheduled for May of 1994 will not take place. Because when I look at where they are in the test program, they should have 25 shots by now; they have only had 17. We are looking at 18 shots. So we are behind in the test schedule, and more importantly, we are behind in delivery of test vehicles.

The reason why we are behind in delivery of test vehicles is because they continue to make these little changes that flowed down to the subcontractors, and it is kind of a circle that doesn't seem to have a beginning or an ending and they are just slow in remaking the piece parts to get it back into the weapons system itself.

I am going to be having monthly meetings with Mr. Kressa. I am going to be looking at what I call meaningful metrics. I need to understand what the engineering change order traffic looks like, how many of them are really design changes, how many are producibility changes. I need to qualify the various subsystems, and I won't have that done for a number of months.

I have talked to Mr. Kressa. He is willing to work with us, to try to come up with something that doesn't bankrupt him while trying to deliver on his promise with respect to this program, and I would hope that in another six to eight weeks, I will have some additional information to share with the committee as to exactly what our final recommendations are going to be to Mr. Deutch and the program, whether or not we delay tests or whether or not we delay long lead and perhaps lead it into an LRIP decision next June.

Mr. DICKS. Why not let Northrop continue to do the test? They are very confident that the test will be successful. Why not let them do it?

Ms. DRUYUN. Well, I will be able to make that decision I think on the 24th of March when I meet with him. If there is something faulty with his test readiness process, and it looks like I am not going to get a quality missile and it is not going to meet its objectives, i.e., hit a target, then he is wasting valuable resources as well as ourselves.

TSSAM CONTRACT CANCELLATION

Mr. DICKS. Would you then recommend to cancel the program?

Ms. DRUYUN. No sir. It is an interesting contract, if you were to sit down and read it, and I wouldn't recommend that. There are two different alternatives available to the government, one is a termination for convenience, and I certainly wouldn't recommend that. The other is a termination for default. The way the contract is written, the soonest I could do that is probably January or February of 1995 and that certainly is an alternative that we have preserved, but given the investment that we have made and the investment that Northrop has made in this program, it is certainly something that I really don't want to do or even consider it at this time.

I would like to see what the results of the independent review teams are, and——

Mr. DICKS. When will these teams have the results?

Ms. DRUYUN. They are going to be in to see me I am hoping within the next week to ten days. They will see me definitely before I have my meeting on the 24th of March.

ACQUISITION PROBLEMS

Mr. DICKS. All right. I have been on this Committee now for 16 years, and I have seen the Air Force have a lot of problems. Why is this?

How long have you been in government service?

Ms. DRUYUN. Twenty-four years.

Mr. DICKS. Why has the Air Force had such difficulty with its programs? And again, I would like to hear from you on this, from both of you. TSSAM, the B–1 the B–2, advanced cruise missile, C–17, and Cheyenne Mountain. I am trying to think of a good one and on major programs, I can't think of one that didn't experience serious problems. Maybe AMRAAM?

Ms. DRUYUN. No. AMRAAM, sir, had its share of problems.

Mr. DICKS. Why does the Air Force have such problems with there major problem?

Ms. DRUYUN. The F–16 is probably a good success story. There are a few out there, sir.

Mr. DICKS. That was a long time ago.

Ms. DRUYUN. Yes, it is.

Mr. DICKS. Can you think of one more recent?

General HAWLEY. From my perspective, I think there are a couple of reasons that I would seize on pretty quickly. The first reason is the firm fixed price development contract, when you are pressing technology, is the wrong way to go. And it creates these kinds of troubles.

As you point out, it creates adversarial relationships between the government and the contractor.

Mr. DICKS. That is certainly the case in the C–17.

General HAWLEY. It makes it very difficult to have a successful program. The second reason is the Air Force, more than the other services, tends to try to push technology across the board. We are a high technology force, and we rely on technology to a greater extent than our sister services for the core missions that we accomplish.

So I think we tend to have a little more risk that we have to deal with than many of our sister services' development programs. I won't throw any stones at my sister services, but I know when they have programs that press the limits of technology as ours have, they have also encountered some problems.

So both of those issues I think are significant factors in why the Air Force seems to have encountered more difficulty than its fair share.

Mr. DICKS. I wouldn't say—seems—to.

Ms. DRUYUN. No. It has. It definitely has.

Mr. DICKS. The Air Force has had a hard time producing anything in recent years. I mean, I have sat here through every major procurement program, and each has been a disaster.

General HAWLEY. I guess I would point to our performance in the Gulf War, with F–15, the F–117, the F–15E, every one of those weapon systems performed spectacularly. Our older systems which we upgraded performed very well. The B–52 did a great job. Our tanker force did a wonderful job.

Mr. DICKS. I am worried about this F–22. You come here with this great report, but I heard those same reports on the B–1. I heard those same reports on the B–2. And none of it was true. I mean, we wound up with a terrible plan for the B–1 with all kinds of problems, and it has never lived up to its promise. The B–2 was so much more expensive than we thought it was going to be. And now, the C–17.

General HAWLEY. But we have learned our lesson on the fixed price contract. The F–22 is not a fixed price contract. We have learned our lessons on concurrency which contributed to a couple of those problems. B–1 is a classic example of that.

This is the least concurrent development program ever. The F–22 is a model program, as Ms. Druyun pointed out.

Ms. DRUYUN. If you look at the amount of demonstration validation work that we did, and that is key. You know, before leaping into a development program, it is absolutely key you go through an adequate demonstration validation program, do your trades, understand where the risks are, and then go back to the user and basically tell them you would like to take a Pre-planned Product Improvement (P^3I) approach.

I think that we are doing that very definitely on F–22. We built four aircraft, we flew them for over a hundred hours. We were able to design using over a million lines of code for avionics, not a trivial task. I think that DEMVAL is key, doing an adequate job, to really reduce the risk and help you understand what it is your challenges are going to be in EMD.

You look at programs like TSSAM, there was no DEMVAL. Look at programs like ACM, there wasn't a DEMVAL. You know, fixed price development is in my opinion the kiss of death, and in any type of development program, you cannot have a fixed price development contract. By the same token, though, you know, a cost type contract, you pay for every action that the contractor takes, and that is why it is very important up front you be allowed to go through a series of trades and continue that trade well into the development.

Mr. DICKS. When you say trades, what do you mean? Give me an example.

Ms. DRUYUN. Well, trades with respect to the requirements themselves, to really push the user hard to set objectives and thresholds and to give you enough trade space in between to be able to understand where the knee of the curve is in meeting something and say, you know, I am going to stop at the objective, to go all the way to the threshold is too darned expensive and it does not give you that much more capability.

I can tell you now when I sit down and I look at some of our new programs that are coming along, and there are not many of them, that I push very hard with the user to give me adequate trade space, and to specify his requirement in such a way that I can go through and do the full spectrum of trades and not try to design me an end solution. So it takes a lot of hard work working closely with the user to let you do an adequate development program, but demonstration validation in my opinion, sir, is key. JDAM is a very good example. You know, some folks suggest that we could have just leaped right into the EMD and my response was absolutely not. I want to take two contractors through an 18-month demonstration program and be able to make a very sound decision and know that when I enter EMD to finish that development program, it is basically going to be low-risk for the government, and more importantly, that I can deliver on the promises that I have made with respect to the cost of that weapons system and its accuracy.

JOINT ADVANCED STRIKE TECHNOLOGY

Mr. DICKS. What about JAST? Are you going to do JAST that way?

Ms. DRUYUN. JAST is basically set up as what I would term really a technology demonstration program, and we are going to be working on a variety of technologies that are geared toward the aircraft that we are looking at in the year 2010.

The whole purpose being to understand the risk, to be able to do trades when you are looking at various avionics structures, for example, or propulsion, whatever it might be that you are looking at, but to be able to really go through and understand what the full spectrum of the technologies are and begin to zero into them and understand—you know, and bring them along to a certain point in development where you could later on introduce them into a follow-on development program. Yes, that is the philosophy that is being used in JAST.

COMANCHE HELICOPTER

Mr. DICKS. Do you think that Dr. Deutch is planning to cut out the DEMVAL on the Comanche? Do you think he is making a mistake?

Ms. DRUYUN. Sir, I am really not familiar with that program, so it would be very hard for me to say.

Mr. DICKS. But according to what you just said, shouldn't we write Mr. Deutch a letter and say you better review Ms. Druyun's testimony before coming to the Committee? I think you are right.

TSSAM PROGRAM

Ms. DRUYUN. I can also tell you in the case of TSSAM, sir, had we done a demonstration validation, we would have understood the risk, and more importantly the problem that TSSAM has suffered from is it was three services. We were told to have 80 percent commonality and when you look at a multiple launch rocket system, it is quite different to a missile that would be carried on an airplane, and then when you look at the number of platforms one had it integrated into, and then the unitary warhead, the BAT warhead, the CEB, I mean you couldn't have put together a bigger recipe for a disaster.

Mr. DICKS. Well, then, why didn't you do that? Why did your predecessors such as Jack Welch continue to appear before this Committee and tell us all of these same stories, that we have to have TSSAM, every year. If you can sell it, we will start it again tomorrow, Congressman. I mean, why did they do that?

General HAWLEY. Well, I think there is a great interest in achieving some commonality among the services, because we can get some economies of scale there. If we can figure out how to satisfy our common requirements——

Mr. DICKS. It sound good.

General HAWLEY. It sounds great. In this case, we made a very complex problem for ourselves by trying to adapt a single weapons system to all three services' requirements, because the requirements turned out to be quite different.

One of the major efforts in JAST is to drive towards a convergence of our requirements. If we can succeed in achieving that convergence in requirements, then we will have a much better opportunity to produce a lot of commonality in the end product.

B–2 INDUSTRIAL BASE

Mr. DICKS. Let's go to the B–2 just for a moment. Now, you know a lot about industrial base. One of things that I am worried about is the bomber industrial base. The Navy is protecting its carrier, and its submarines industrial base. Yet we have the B–2 industrial base out in Southern California right now, with 18,000 people working there, and they are in a position to continue the production of these B–2s. It is clear we do not have enough bombers. I mean, any study that looks at bombers force structure will tell you that 107 is not enough. And yet that is where we are headed.

Now, why is the Air Force not more interested in protecting its bomber base, its bomber production base? All of these subcontractors will go, all of these skilled people will go. I mean, have you thought about this?

General HAWLEY. Yes, sir. This is a tough issue. It is an issue that is driven by the shrinking budget, and it has forced some very difficult trades on the Air Force.

Mr. DICKS. We all have parochial interests and concerns, but I can't see much that is more important than the bomber. The bomber force is crucial. A number of studies have been conducted and financed by the Air Force, by Rand and Jasper Welch. Everyone who has looked at this issue indicates we do not have enough. In order to make the B–2 an effective conventional war fighting capability, you have to have 40 to 60 aircraft.

Now, if we allow production to stop at 20 aircraft and in fact we do not have enough bombers, or we continue to have problems with the B–1 then we eventually would have to start over, and build another bomber. A Stealthy one would cost a great deal in development. What did we spend on the R&D phase of the B–2 thus far? $30 billion?

Ms. DRUYUN. No I think it is about $23 billion.

Mr. DICKS. That is a lot of money. Are we going to then say 15 years from now, that a big mistake and a bad decision was made, now we have a bomber crisis. Is it going to take us 10 to 15 years and another $40 billion to get into a position where we can produce another bomber? Is that what you are leaving us with?

General HAWLEY. We will have a full set of production tooling available if anybody wanted to restart it. Our problem is we don't see where we can afford to keep this line open and buy bombers for the rest of this decade. There is not enough money in the Air Force budget to support that without unacceptable compromises in other capabilities.

Mr. DICKS. This $4.8 billion in Minuteman III, plus O&M would be a good opener. That is a system that has no conventional capability. We have 18 Trident submarines with 254 warheads per submarine. I mean, how much of that capability do we really need for deterrence? Who is out there to deter? At some point you got to make some tough decisions and this is one I would give up in a minute.

General HAWLEY. These issues aren't mine, but I am a three star, so I worry about them.

Mr. DICKS. That is why we have you up there.

General HAWLEY. But the bomber force and the ICBM force are very important missions.

Mr. DICKS. But if you had to choose, the bomber can be used conventionally. Kissinger was correct. You can't use these strategic nuclear weapons. They are there for deterrence and you have got to assume that they are never going to be used.

The bomber, on the other hand, you can use conventionally. You have dual purpose weapons system here, with the production line open. You can produce it now less expensively than you are ever going to be able to do it in the future. It appears the Navy cares a lot more about its industrial base and the Air Force could care less. I think it is one of the worst decisions we can make because we know today we don't have enough bombers.

Every study that we have financed says we need 40 to 60 B–2s. And I am just asking you, the acquisition people, if anyone is going to make the case about industrial base, it will be the two of you or am I wrong on that? Are you in charge of protecting this industrial base?

General HAWLEY. Well, it is a bigger issue than us. This is a defense issue.

Mr. DICKS. Did anyone in Air Force ever look at this thing from an industrial base perspective?

General HAWLEY. There is a study going on to examine what our industrial base policy ought to be to try and examine which elements of the industrial base you need to fund specifically.

PROTECTING AIR FORCE INDUSTRIAL BASE

Mr. DICKS. Secretary Perry testified before the Senate Defense Appropriations at the beginning of March. He testified that if he had to choose between the bomber force and the submarines, he thought the bombers were more important.

I would agree with Secretary Perry. But I don't see the Air Force trying to protect its industrial base. I think this loss will be a huge loss, and it will cost us a great deal of money to come back to it at some future date.

The B–52s are 50 years old——

Mr. LEWIS. I know that we do have the bomber hearing ahead of us, but you are asking here, you said it is a defense issue, Norm just suggested what he heard or has read, that the Secretary said on the other side. What did the Air Force say in the midst of this? How did you answer the question he was asking you when you were talking to DOD about it? It is an industrial base. You know, do you have trade-offs that are so painful that you can't make that choice?

General HAWLEY. Our problem with protecting the line this year is that it implies a commitment to all of the succeeding years, and it is the whole thing that we can't find a way to choose.

Mr. LEWIS. But if you cut off the line this year.

General HAWLEY. I think the proposal that is in front of the Congress is to spend $150 million to preserve an option, and our problem with being vigorous supporters of that proposal is that that $150 million is only good if you follow it with six or $700 million in the following year and a couple of billion in each succeeding year. And at the budget levels that we see ahead of us, we can't figure out how to fit that within our force without unacceptable trade-offs.

FUNDING B–2

Mr. LEWIS. When we have the bomber hearing, are you going to be urging that the Air Force come in as a part of that discussion and argue not to go forward with the bomber—with this line or this side of the priority, because of conflicts you see down the line?

General HAWLEY. I think we need to be heard, yes, sir.

Mr. DICKS. If the gentleman would yield, let me just give you three right here. Minuteman III, $4.8 billion, JAST, $2.0 billion; B–1, $2.7. That will give you $9.5 billion. That would buy you 16–20 B–2 aircraft at $600 million a copy.

General HAWLEY. It is hard to say what we would have to pay for them because I think we would have to ask the contractor to make a proposal, but we don't think that we could get 20 airplanes for that kind of money.

Ms. DRUYUN. The current recurring costs for a B–2 is in the neighborhood of $750 to $800 million a piece, and that is for the last four aircraft.

Mr. DICKS. I am told that they can do it for approximately $595 million.

Mr. DRUYAN. But I guess the other piece—and I don't wish to really debate this with you, sir, but the other question one has to ask is what goes along with it? There is the support equipment and the spares. You know, if it is not unusual that a contractor will give me one figure, but when I say——

Mr. DICKS. Have you explored this, or is it that you received the word, and you are not going to do this no matter what? I am looking at our near-term defense requirements and I had to make a choice between the F–22 and the B–2, and I could have 30 to 40 more B–2s, I believe the bomber is more important than just about any other system, and we haven't got enough of them. The long range bombers give you that worldwide reach. The kind of world we are in now, requires a stealthy aircraft that has such reach. The B–2 can go from here to the Middle East with one aerial refueling. With sensor fuzed weapons, the B–2 provides a capability unlike anything we have ever had before. The Rand study simulation indicated the aircraft could interdict 60 percent of the Iraqi mechanized vehicles. I don't understand why the Air Force doesn't take this capability more serious, except that the Air Force is dominated by people today who are only interested in the hottest, stealthiest fighter.

General HAWLEY. I think the question is one of balance. And as an Air Force—as our country's first Air Force, we have to provide a range of capabilities to our combatant commanders. Everything from airlift to reconnaissance and everything in between, and the first thing he will ask of us is air superiority, complemented by mobility, because he needs to get his forces there fast, that says F–22 and C–17.

Mr. DICKS. But General, I understand that. But have you read the Rand study on the B–2 capability. Have you seen the simulation?

General HAWLEY. Yes, sir.

B–2 SCENARIOS

Mr. DICKS. In the simulation, Saddam has a mechanized division moving into Kuwait. Three B–2s, with one aerial refueling, and sensor fuzed weapons, take out nearly 50 percent of the mechanized vehicles. Stops it. We have never had—an ability to stop a mechanized division with any combination of weapons, short of, I mean, using nuclear weapons.

This is an incredible war fighting capability, and I just don't understand why the Air Force just seems to ignore that.

If it were up to me, I would make room to have enough of that kind of capability. Stealth technology, worldwide reach, conventional weapons, this is the greatest development in conventional war fighting I think there is.

And you deploy immediately. You don't have to wait to position these carriers—you can go immediately.

Now, I still—I just still don't understand why the Air Force won't even make an effort.

BUDGET PRIORITIES

General HAWLEY. I think when General McPeak was asked to establish his priorities or to state his priorities——

Mr. DICKS. There is only one priority with General McPeak and that is the F–22, and you and I both know it.

General HAWLEY. And bomber upgrades. It is his number two priority program. If you have to rank order.

Mr. LEWIS. Mr. Chairman, if I could enter into this.

Mr. DICKS. I yield.

Mr. LEWIS. I have raised this point at other hearings, but it was a rather startling clash point for me on the way back from Korea. We stopped in Alaska for just a moment, and we had had some of these conversations regarding B–2, and Mr. Dicks and I were carrying on back and forth and a young colonel, who was driving, was then suddenly asked a question: What do you think about this? And he kind of created a little more frost inside the car by suggesting that delivering the troops and materiel there, C–17 essentially was very important from his perspective. It just kind of shifted the gear.

And if you get somebody over here who says the F–22 is very important and delivering the stuff, transporting it is very important——

Mr. DICKS. But what is most important——

Mr. LEWIS. Wait. Putting that into the context where you suddenly have a Secretary who gives pretty high priority to bombers, too, in terms of the whole mix of DOD I would think the Air Force would want to really think through whether you couldn't afford more B–2s in terms of your priorities. Do you hear what I am saying?

Mr. DICKS. Yes. Sure.

Mr. LEWIS. I am suggesting that—I personally agree with you about F–22 and C–17, but I feel strongly about the bomber force as well. And there may be an opportunity here, without your helping us exercise the opportunity—I can tell you that the figure of $750 or $800 million is going to help Mr. Dellums on the Floor, no doubt about it.

I wouldn't want to cast any aspersions on his priorities, but we seem to have different priorities here.

General HAWLEY. I guess all I can say is that this is a tough issue for the Air Force as well, and we have studied it very hard.

NUCLEAR POSTURE REVIEW

Mr. LEWIS. Have you studied it since there is a new Secretary who, obviously, has a priority that is interesting?

General HAWLEY. The decision will be addressed in the Nuclear Posture Review.

Mr. DICKS. When will the Nuclear Posture Review be completed?

General HAWLEY. I think it is the June timeframe, but I would have to get back to you with the date. I don't have that date.

[The information follows:]

Current projections indicate the Nuclear Posture Review will be completed by late summer.

B–52 PLAN

Mr. DICKS. You know, General, the Secretary has also said that he is revisiting this bomber question.

General HAWLEY. Yes, sir.

Mr. DICKS. How are we going to fix up the B–52s? You gave us your plan for the B–1s. Do you have a plan on the B–52s?

General HAWLEY. Yes, sir. And we are asking your support this year for investments to continue the upgrades with the B–52s that are in the force to put the conventional modifications on those aircraft so that they can deliver the Harpoon and the other weapons that we need those airplanes to deliver.

Mr. DICKS. Forty-seven, is that what we are going to have?

General HAWLEY. Forty-seven B–52s. Yes, sir.

Mr. DICKS. Is this number coming down to 40?

General HAWLEY. Forty-seven is the right number.

Mr. DICKS. Thank you Ms. Druyun and General Hawley. There will be additional questions for the record.

The Committee will stand in recess until 10:00 a.m. tomorrow morning.

[CLERK'S NOTE.—Questions submitted by Mr. Dicks and the answers thereto follow:]

BOMBER FORCE—B–2

Question. My concern remains at what level and composition of the bomber force best satisfies the U.S. national military strategy at the least cost. We are retiring B–52's, the B–1s remain inherently plagued with problems, as we continue to close our overseas bases we need the force projection capability like that of the B–2 bomber. We need the B–2 to also protect our allies bases as well; the Saudi bases proved to be invaluable to our success and Hussein's defeat. Is there any study, analysis or national security rationale in existence which says only twenty B–2s are adequate for our future defense needs? Have you seen the Rand analysis calling for more B–2s?

Answer. The Bottom-Up Review is the most recent analysis of bomber requirements that I am aware of. The Bottom-Up Review considered the numbers of bombers in general, and assumed that only a limited number of B–2s would be available as part of the overall bomber force to support the two major regional conflict scenarios. I know of no study which attempted to determine an "optimum" mix of B–52s, B–1s, and B–2s.

Yes, I have reviewed the RAND analysis that addresses the issue of additional B–2s.

Question. Do you agree that the U.S. precision conventional attack capabilities would benefit from having more than twenty B–2s?

Answer. While more B–2s would result in the ability to carry more precision conventional munitions, the Air Force has no plans at this time to procure more than 20 B–2s. The Air Force budget was developed with the best mix of weapon systems to support the national military strategy under prescribed fiscal constraints. Procurement of additional B–2s would necessitate either redirection of Air Force funding from other valid requirements or an increase in Air Force funding.

Question. The GATS program for the B–2 has been initiated and the B–2 will be the first bomber capable of delivering precision conventional weapons. Will you support GAM procurement if it is clear JDAM cannot be fielded by 1996?

Answer. The Air Force will address procuring GAM if the JDAM program does not meet its schedule. The current JDAM schedule is to flight test in FY96 for an FY97 Block 30 capability on the B–2. The JDAM program begins delivery of JDAM test assets in mid–FY97.

B–1 PROGRAM

Question. In your testimony, you indicated that the B–1 will deliver the "lion's share of conventional weapons," and that given its large payload, long range, and speed will be the primary conventional bomber for the 21st century. Today the B–1 can only carry dumb conventional bombs, best used for carpet bombing. Given the problems the B–1 has, when will it be an effective bomber force, i.e. carry precision guided or other smart weapons systems?

Answer. The B–1 is a highly effective conventional bomber today, delivering up to 84 Mk–82 500–lb class unguided gravity, or dumb, bombs from both high and low altitudes. The delivery of over 44,000 lbs of ordnance in less than two seconds makes the B–1 a significant threat to any adversary. The planned Conventional Mission Upgrade Program will provide theater commanders added flexibility in employing this resource in conventional conflicts. In FY96, the B–1 will gain additional gravity weapon capability with cluster bomb units (CBUs), highly effective weapons designed to halt advancing enemy forces. Smart weapons capability will be achieved with the Joint Direct Attack Munition (JDAM) in FY01. The Air Force is investigating options to increase RDT&E funding to accelerate JDAM integration. Further, the planned B–1 weapons integration effort will add two smart munitions currently under development, the Joint Standoff Weapon (JSOW) and Tri-Service Standoff Attack Missile (TSSAM), in FY04.

Question. Given the fact that the Air Force continues to state that the B–1 will be the backbone, the primary bomber, the cornerstone of its bomber force, why aren't you funding the conventional munitions upgrade package at more of an accelerated level? Can any of the upgrades be accelerated?

Answer. The Air Force is committed to achieving enhanced B–1 conventional warfighting capability as quickly as possible, given budgetary constraints. The B–1 Conventional Mission Upgrade Program (CMUP) improves weapons delivery capability and defensive system capabilities at reasonable cost, ensuring an overall low-to-moderate risk program. First Cluster Bomb Unit (CBU) capability, for enhanced anti-armor and anti-materiel attack, will be achieved in FY96. This will be followed by advanced weapons delivery capability, including the Joint Direct Attack Munition (JDAM), Joint Stand Off Weapon (JSOW), and Tri-Service Standoff Attack Munition (TSSAM). In addition, the defensive system upgrade is scheduled to be restarted in FY96.

The Air Force is investigating options to increase the RDT&E spending to accelerate JDAM integration. The FY94 Omnibus Reprogramming Request may include a requirement for additional funding to help achieve smart weapons capability earlier and request relief from the FY 94 Authorization Conference language limiting B–1 FY94 RDT&E spending to $49M.

Question. Given the fact that one MRC will undoubtedly use all or most of the bomber fleet, then swing what bombers necessary for the second conflict, it is imperative that all of the B–1s be conventionally effective. When would the entire B–1 bomber force have all of the necessary conventional capabilities?

Answer. The B–1 Conventional Mission Upgrade Program (CMUP) is a phased approach to improving the weapons and ECM capabilities of the B–1 fleet at reasonable cost insuring an overall low-to-moderate risk program. The schedule for major B–1 conventional capabilities integration on 72 aircraft is shown below (LOC-Limited Operational Capability; FOC-Full Operational Capability):

B–1 Conventional Weapons Upgrades (for 72A/C)

	LOC	FOC
Cluster Bomb Unit (CBU)	FY96	FY97
Joint Direct Attack Munition (JDAM)	FY01	FY03
Joint Stand-Off Weapon (JSOW)	FY04	FY07
Tri-Service Standoff Attack Missile (TSSAM)	FY04	FY07
ECM Upgrade	FY03	FY07

Weapon upgrades include installing the Mil-Std-1760 interface, Global Positioning System (GPS), and new avionics computer. During the FY96 budget process, the Air Force will continue to investigate options to provide funding for CMUP upgrades to the B–1s in attrition reserve status, and ways to accelerate B–1 JDAM capability to FY99 when the weapons roll off the production line.

Question. What types of conventional capabilities does the B–52 have today? Can these capabilities, the CALCM and the HAVE NAP, be put on the B–1?

Answer.

CURRENT B–52H CONVENTIONAL CAPABILITY (CURRENTLY CERTIFIED)

Weapon	Guidance system	Weight	Warhead weight/type	B–52H Int/Ext[1]
General purpose:				
MK–82 LDGP	N/A	500	500	27/18
MK–82 SE	N/A	500	500	27/18
MK–82 AIR	N/A	500	500	27/18
MK–84 LDGP	N/A	2000	2000	8/10

CURRENT B–52H CONVENTIONAL CAPABILITY (CURRENTLY CERTIFIED)—Continued

Weapon	Guidance system	Weight	Warhead weight/type	B–52H Int/Ext [1]
M–117 LDGP	N/A	750	750	27/18
M–177 R	N/A	750	750	27/18
Precision munitions:				
GBU–10 (Paveway I)	[2] Laser	2000	2000	0/8
GBU–10 (Paveway II)	[2] Laser	2000	2000	0/10
GBU–12 (Paveway III)	[2] Laser	500	500	0/10
Standoff munitions:				
AGM–86/C CALCM	INS/GPS	3000	1000	8/12
AGM–84 Harpoon	INS/Radar	1000	500	0/8
AGM–142 HAVE NAP	TV/II R	3000	750/I–800	0/3-4
CBU:				
CBU–52	N/A	750	BLU–61	27/18
CBU–58	N/A	750	BLU–63	27/18
CBU–71	N/A	750	BLU–86	27/18
CBU–87 CEM	N/A	1000	BLU–97	6/18
CBU–89 Gator	N/A	750	BLU–91 & 92	6/18
MK–20 Rockeye	N/A	500	MK–118	0/18
Naval mines:				
MK–36 DST	N/A	500	500	27/18
MK–40 DST	N/A	1000	1000	0/18
MK–52	N/A	1000	625	12/18
MK–55/56	N/A	2000/2000	1290/360	8/12
MK–60 Captor	N/A	2000	MK–46	8/10
MK–62	N/A	500	500	27/18
MK–63	N/A	1000	1000	0/18
MK–64/65	N/A	2000/2000	2000/2000	8/10

[1] Internal/External Carriage.

[2] Requires a second aircraft to guide the weapon. Current as of 31 Mar. 94.

Although there has historically been Congressional interest in modifying the B–1 to carry cruise missiles both internally and externally, the Air Force does not have a requirement for the B–1 to be a cruise missile carrier. In addition, START Treaty provisions prohibit using the B–1 as a cruise missile carrier (to include CALCM). Although the ALCM was flight tested on the B–1 and the ACM was designed to be compatible with the B–1 flight environment when carried externally, neither system was ever deployed on the B–1. HAVE NAP does not fit on the B–1, and it would be cost-prohibitive to pursue this as an additional capability. The preferred approach is for the B–1 to carry other direct attack and stand-off weapons, including CBUs, JDAM, JSOW, and TSSAM.

CONVENTIONAL CAPABILITIES

Question. The Air Force indicated that in their plan for 100 PAA bombers, there would be an attrition reserve of approximately 30 B–52s and 26 B–1s. Do you plan to fund all of the conventional munitions upgrades for the entire B–1 fleet to include those in attrition reserve?

Answer. The current heavy bomber force structure plan will place 30 B–52s and 27 B–1s into attrition reserve status. The plan for B–52s is subject to change, pending results of the ongoing Nuclear Posture Review. The Air Force prefers to apply the Conventional Mission Upgrade Program (CMUP) weapons and ECM enhancements to all B–1 aircraft for fleet commonality. However, the current budget funds upgrades for up to 72 aircraft. The Air Force will continue to investigate options to provide funding for all of the

B–1s in attrition reserve to receive CMUP modifications, and plans to resolve the issue during the FY96 budget process.

Question. FY95 request includes CMUP for 72 B–1s—when will you fund the remaining aircraft?

Answer. The Air Force will continue to investigate options to provide funding for the B–1s in attrition reserve to receive CMUP modifications, and plans to address the issue during the FY96 budget process.

Question. Is conventional upgrade of the B–1 an Air Force priority?

Answer. Yes, integrating precision munitions on bombers is one of the Air Force's top three priorities. The B–1 Conventional Mission Upgrade Program is a high priority effort to give the B–1 improved conventional war-fighting capability within current budget constraints. The upgrades to provide this capability include up-to-date precision and near-precision weapon capabilities and a suitable defensive system to more effectively employ these weapons.

With the B–2 program capped at 20 aircraft's and the diminished size of the B–52 fleet, the B–1 will have the lion's share of conventional bomber responsibility in future conflicts. We will build our conventional bomber force around the B–1 well into the 21st century.

Question. What capabilities will those B–52s in attrition reserve status have?

Answer. The B–52Hs being placed in attrition reserve will retain their existing nuclear and conventional capabilities, but these aircraft are not planned to receive the conventional upgrades scheduled for the bombers being retained in the active forces.

The attrition reserve B–52Hs will retain nuclear gravity weapon, Air Launched Cruise Missile (ALCM), and Advanced Cruise Missile (ACM) capability. Additionally, they can employ a wide array of non-precision gravity weapons, like Mk–84s, most cluster munitions and naval mines, and will retain Conventional ALCM (CALCM) capability. The Air Force currently does not plan to give these aircraft conventional enhancements, which would allow carriage of precision weapons.

Question. What will the congressionally directed operational readiness assessment provide?

Answer. The operational readiness assessment (ORA) of the B–1 is scheduled for the period 1 June–30 November 1994, using the 28th Bomb Wing at Ellsworth AFB, SD. The ORA is designed to evaluate the aircraft's ability to operate and sustain the desired operational readiness rate given 100 percent of the planned supply and manning. The ORA is structured to allow direct comparisons to other ACC units and the test unit's own past performance. It will provide answers to the following five questions:

(1) Can the B–1 sustain a 75 percent readiness rate?

(2) What readiness rate could be sustained, if assessment results are below the target readiness rate of 75 percent?

(3) What additional support requirements would be needed to get the entire fleet to a 75 percent readiness rate?

(4) What is the estimated cost of additional support required to sustain 75 percent rate for the mature B–1 fleet?

(5) What are the best methods to mitigate identified problems? The results will be documented in a report by the Secretary of the Air Force to the congressional defense committees and the Comptroller General of the United States within 90 days after completion of the test.

Question. What is the status of the B–1 spare parts backlog?

Answer. As of 28 February 1994, the B–1 backlog of depot-level repair parts was approximately 2900 items. This backlog is due primarily to a shortfall in FY93 funds for Interim Contractor Support (ICS). Depletion of the backlog is dependent upon the Air Force's ability to improve overall B–1 supportability through related efforts such as ICS cost reduction, accelerated transition to organic repair to the maximum extent possible, and aggressive management of daily repair requirements.

Question. What is the status of the engine spares?

Answer. As of 29 March 94, the Air Combat Command (ACC) B–1 fleet-wide engine spares status was 28 serviceable spares. The current ACC War Reserve Engine (WRE) level is 29 serviceable spares. Due to force structure realignments, ACC WRE level is reduced to 20 spares, effective 1 April 94.

Question. Is there funding in the FY95 request to address the parts backlog?

Answer. The FY95 request did not specifically include additional funds to reduce the parts repair backlog. However, the Air Force has aggressively attacked the backlog problem by focusing efforts on ways to reduce the cost of interim contractor support, accelerate the transition to organic repair capability, and closely manage the daily repair requirements. With the benefits received to date from these efforts, plus what we anticipate in the future, fully funding the FY95 request should be adequate to reduce the repair backlog by the end of that fiscal year.

AIRBORNE LASER

Question. Is the program structured in such a way that the primary technological issues will be resolved prior to proceeding with the demonstration phase?

Answer. Yes. The ABL program is structured to carefully and methodically reduce technical risk and to satisfy established exit criteria to demonstrate the feasibility of a Fully Operational Capability (FOC) ABL. The exit criteria are laser propagation and lethality, and aircraft integration. First, Phillips Laboratory, in concert with other national laboratories, is executing a comprehensive ABL technology insertion program. The technology insertion program, ongoing since 1992, will provide early answers to issues associated with propagating lasers over the long ranges required. To date, the results have been encouraging. No fundamental limitations have been identified and many assumptions on the nature of the upper atmospheric turbulence, the ability to compensate for that turbulence, and target vulnerability are proving conservative. Second, the 33 month, dual competing contract concept design teams will develop top level designs for a fully capable ABL and detailed designs and specifications for the ABL Demonstrator. Although the ABL demonstrator is a technology demonstration, the Demonstrator design must be fully scaleable and traceable to the fully capable ABL. This will allow a smooth transition through the engineering and manufacturing development to production should the Air Force choose to proceed with a fleet of operational ABLs.

Question. The Air Force requested funding for the concept design phase of the ABL program. It is my understanding that the ABL program addresses one of the most promising concepts for boost phase intercept of theater ballistic missiles. What advantages does this program offer relative to other TMD alternatives?

Answer. The ABL has the potential for very high payoff relative to other TMD alternatives by destroying theater ballistic missiles in the boost phase, prior to warhead fractionation, over the enemy's homeland. This is particularly significant for theater missiles with chemical biological or nuclear warheads, as the warhead and debris will fall on enemy territory. The ABL will provide a very wide area protection capability and it will be capable of 20–40 missile engagements per mission. The ABL will be able to accept cueing from on board, as well as off board, sensors. Thus it will be able to autonomously detect, acquire, and track boosting missiles and transmit lethal energy at the speed of light. The ABL will have the advantage of mobility and flexibility of an airborne platform. It could quickly deploy to theater and transition directly into air defense operations: a fight on arrival capability. Additionally, it could quickly respond to changing threats or new defense priorities.

Question. What issues need to be resolved during the concept design phase to allow the program to proceed to the demonstration phase?

Answer. The two basic issues to be resolved (or exit criteria to pass) during the concept design phase are laser propagation and lethality, and aircraft integration. First, can the ABL kill the target by focusing sufficient lethal energy to destroy a theater ballistic missile at long range? Will the laser beam propagate the required distance with adequate compensation for the effects of atmospheric turbulence? Detailed investigation of these issues have leveraged two decades of major technical advances. The Chemical Oxygen Laser has been demonstrated at high power with excellent beam quality. Uncooled optics, made possible with extremely high-reflective coatings, dramatically reduce system weight and unwanted beam jitter. Proven optical stabilization techniques can compensate for aircraft motion and demonstrated adaptive optics can compensate for atmospheric turbulence. Second, can a laser device and beam control system be packaged in a militarily useful aircraft? This criterion involves key engineering issues of weapons element weight and integration into the aircraft platform. Using modern shorter wavelength lasers coupled with mature, proven adaptive optics technologies, we now have the potential to package a new laser system in a 747-class aircraft with the power and attendant lethal range in hundreds of kilometers. During the concept design phase, the two competing contractors will provide detailed design concepts to package these new generation lasers, fire control, beam control, and battle management systems into a modified 747 aircraft prior to the Air Force committing to build the ABL Demonstrator system in 1997.

SRAM–LEAP

Question. The Air Force will receive $200–$300 million to bolster the ascent/boost phase intercept program. Its my understanding that one of the concepts being explored was the SRAM missile paired up to a LEAP vehicle. Is this combination still being considered?

Answer. The initial SRAM/LEAP concept was based on the destruction of a Ballistic missile in the exo-atmosphere. In January of this year, the Under Secretary of Defense for Acquisition and Technology decided that technology had matured to the point to support the development of a weapon capable of destroying ballistic missiles earlier in flight. This weapon is intended to destroy theater ballistic missiles in the boost phase, but will also have some capability during the ascent phase of the ballistic flight trajectory. As the lead service for this development activity, the Air Force, in conjunction with the other services and BMDO, is currently working on a program plan for OSD approval in late April. The fundamental acquisition strategy is based on full, open competition, with no designs supporting the destruction of theater ballistic missiles in the boost phase ruled out.

NON-DEVELOPMENTAL AIRCRAFT/AIRLIFT

Question. Its my understanding that a program office for the non-developmental aircraft program has been established in the Air Force acquisition community, what requirements and criteria will be used to determine a source selection?

Answer. Requirements for a Non-Developmental Airlift Aircraft are in the process of being defined. The Air Force will publish the requirements in an Operational Requirements Document to be finalized later this year. Since operational requirements are not defined it is premature to specifically define source selection criteria.

Question. In your testimony, you indicate “the C–141 is rapidly approaching the end of its useful service life—and that without a replacement aircraft this nation’s ability to project forces worldwide will be greatly curtailed”. You are retiring the C–141s at the planned rate to be completed by 2005. The procurement and delivery of the C–17 is not what had been previously counted on—obviously there is a shortfall. Why aren’t you addressing—in a cost effective manner—the existing non-core airlift shortfalls that we are facing today?

Answer. The Air Force is currently planning to retire all C–141s by 2006. The 1995 President’s Budget held our strategic airlift capability at a relatively constant level while taking into account a slowed C–17 acquisition profile and an accelerated C–141 retirement schedule. However, the Air Force remains concerned about ensuring this nation has an adequate airlift capability. There are a number of studies in progress that will help us define the airlift requirement and force mix needed for the next century. The Mobility Requirements Study based on the forces from the Bottom-Up Review will clearly define our future airlift requirement to include outsize, oversize, and bulk cargo. It is essential to know the requirement in order to ensure the right size and type of airlift fleet. If we procure a non-developmental airlift aircraft (NDAA), we must also ensure it meets our needs. Accordingly, analysis is in progress both by contractors and the Department of Defense to address possible NDAA configurations. The current plan calls for an integrated acquisition decision on airlift force structure in November 1995. The coupling of the C–17 and NDAA decisions ensures a comprehensive, integrated approach to the nation's airlift needs.

Question. Given General Hoar's testimony before this committee and before other defense committees on the fact that airlift is broken, isn't there a danger in waiting until the Fall of 1995 to make a decision on additional airlift when the requirements are known today?

Answer. No, the requirements are not completely known today. There is considerable risk in making a decision on the NDAA before the airlift requirement is clearly defined by the Mobility Requirements Study/Bottom-Up Review Update (MRS/BURU) and before the C–17 Milestone IIIB decision is made. In addition, the health of today's organic airlift fleet has shown significant improvements since events in the fall of 1993 grounded most of our C–141 fleet. Air Mobility Command anticipates corrective maintenance actions will return 197 C–141 aircraft (80% of total inventory) to unrestricted operations by April 1994 and the entire fleet by December 1994. These improvements in the C–141 fleet reinforce the DOD decision to define the requirement and accurately determine, by the fall of 1995, the NDAA best suited to meet future airlift modernization needs should the C–17 program not meet required performance thresholds.

Question. Why does the NDAA program continue to be linked with the C–17, when there is a real shortfall in oversized cargo load capabilities? Do you really plan to use the expensive C–17 aircraft for oversized cargo and palletized loads?

Answer. The acquisition strategy for airlift modernization is based on two points. First, we need an aircraft like the C–17. There is no other aircraft that can provide the flexibility we need in a core military airlift aircraft. Second, if the C–17 does not meet expectations, an alternative must be immediately available. To that end, we have started a streamlined acquisition process that will lead to an integrated decision on airlift force structure at the C–17 Milestone IIIB in November 1995.

A decision made now on a non-developmental airlift aircraft would lack three essential pieces of information. First, the Joint Staff is updating the Mobility Requirements Study based on the results of the Bottom-Up Review. The results of this study may alter our assessment of both the type and quantity of airlift we need. Second, we do not know today the extent of the modifications that may be necessary to make a commercial derivative aircraft responsive to military needs. Third, the Air Force will better understand the capabilities of the C–17 at the Milestone IIIB decision point because the results of the flight test program and the reliability, maintainability and availability evaluation will be available along with an assessment of the contractors' performance after the two year probationary period. These three points argue very strongly for making an integrated airlift force structure decision in November 1995.

The C–17 can carry all three types of airlift cargo (outsize, oversize and bulk). It can deliver this cargo by landing at a major airfield with a robust infrastructure like a commercial freighter aircraft; or by landing at a short, austere airfield unusable by commercial freighter aircraft; or by airdropping when landing is not feasible. The C–17 aircraft will be utilized in whatever role best meets the needs of the theater commander.

ALERT, LOCATE AND REPORT MISSILES (ALARM)

Question. What are the requirements for the new system, the costs, and when will it become operational? Has the department performed the usual DAB to validate these costs and schedules?

Answer. The Air Force began developing the requirements for the Alert, Locate and Report Missiles (ALARM) in December 1993. We are starting from the draft FEWS Operational Requirements Document (ORD) baseline and establishing lower performance thresholds for the initial Block of four ALARM satellites. We plan to publish a draft ORD this summer for inclusion in the ALARM draft RFP. In addition, we plan to finalize the ORD no later than this fall for inclusion in the ALARM RFP. While still being studied, it is likely the first block of ALARM satellites will:

—cost less than FEWS
—launch on an MLV
—not perform on board data processing
—not contain crosslinks
—use an updated, consolidated DSP ground system

The FYDP funding for ALARM is:

Fiscal year:	
1995	150
1996	180
1997	150
1998	285
1999	500

This funding profile allows for an initial satellite delivery in 2004 with launch and initial operational capability possible later that year.

We plan to conduct a DAB program review in Oct 94 to review the cost and schedule estimates of the ALARM program. The cost estimate we are currently using is the cost estimate we built during last summer's Bottom Up Review which was reviewed by the OSD CAIG budget analysts.

Question. Now that you have decided to keep DSP #23, terminate FEWS and start a follow-on system, where or how will Brilliant Eyes fit into the architecture?

Answer. The Brilliant Eyes program has been continued as a flight demonstration program within the National Missile Defense (NMD) technology readiness program. Should it be fielded as an operational system, it will be employed as a ballistic missile tracking system for NMD and TMD, and the DSP/ALARM role of early warning.

The DSP/ALARM systems are designed to detect missiles during boost phase where they have a bright infrared signature. The early warning provided by these systems can be used to alert troops, enable passive defense options, and cue active defenses. However, since these systems view targets against the warm earth background, they cannot track colder/dimmer non-thrusting targets.

Brilliant Eyes will be able to track dimmer non-thrusting targets. This is possible because it will view targets against the cold background of space from its low-earth orbit. The BE satellites will detect and acquire boosters in theater "hot spots" and continuously track targets through the reentry phase of flight. For launches occurring outside the BE hot spots, BE will require a tip-off from the space-based early warning system to acquire the target. Once acquired, BE will continue tracking the target through reentry.

Question. It is my understanding that Brilliant Eyes does in fact have theater capabilities, are you taking full advantage of these capabilities in the theater missile defense architecture?

Answer. The objective Brilliant Eyes system, as currently envisioned, will have significant Theater Missile Defense capability. The early warning architecture, known as the Theater Event System (TES), will integrate Brilliant Eyes with other existing and planned assets such as Talon Shield, Joint Tactical Ground Stations (JTAGS), and the AWACS EAGLE airborne sensor.

The Brilliant Eyes flight demonstration satellites do not perform the real-time processing needed in the TMD environment. They will provide phenomenology data for use on future TMD development efforts.

[CLERK'S NOTE.—End of questions submitted by Mr. Dicks. Questions submitted by Mr. Dixon and the answers thereto follow:]

TSSAM

Question. How do the flight test results from TSSAM compare with other cruise missile programs at a similar state of development?

Answer. TSSAM's success rate is comparable to that of other cruise missile programs in a similar stage of development.

Comparing TSSAM to the Tomahawk programs (SLCM, ALCM prototype, GLCM), there are several similarities. Tomahawk used an early risk reduction effort similar to the TSSAM Control Test Vehicle series prior to fully integrated system testing. Tomahawk also had multiple variants for multiple users/launch platforms.

Results Comparison of the early vehicles:

Missile	Flights	Success rate (percent)
Tomahawk	19/20	95
TSSAM CTV		

Full systems level testing. Comparison of TSSAM to the AGM-86B, Tomahawk, and ACM:

Missile	Flights	Success rate (percent)
AGM-86B	22/31	71
Tomahawk	21/30	70
ACM	16/26	62
TSSAM [1]		

[1] TSSAM success rate is expected to grow during the remaining test program to achieve the required final mission reliability of ———.

Question. I understand that the first variant planned for production is the CEB variant for the B–52. How many flight tests remain to be completed for that variant, and when do you expect them to be completed?

Answer. We will provide this information to Congress under separate cover.

Question. If you believe that the recent flight failures are basically quality failures, could you please describe those for us so we can get an idea of their nature, and would you describe the corrective actions undertaken by the contractor?

Answer. The last three attempts were failures. All were due to process/design problems at Northrop and their subcontractors.

The last Army attempt in June 1993 failed when the vertical tail fin did not lock into position. The cause of the failure is attributable to an inadequate redesign and verification of producibility design changes.

The second Navy attempt from an A–6 aircraft in September 1993 failed due to an electronics short in the Power Conversion Unit (PCU). The cause of the failure was traced to an excessive power surge through a resistor, possibly due to wire chafing.

The reflight of the second Navy attempt from an A–6 in January 1994 failed due to a shorted electrical system. A loose screw in the fuel pump shorted the fuel pump power cable to structure. The cause was the improper application of LOCTITE on the screw—a process problem.

An independent flight readiness review (FRR) process team has been established to assess the adequacy of the TSSAM FRR process. This team is focusing on measures to improve TSSAM's readiness to be successfully flight tested. As a result of the team's recommendations, added focus is being placed on building confidence for flight tests via improved ground testing, teardowns, environmental definition testing, etc.

Question. Recently a launch from an F–16 was aborted. What caused that problem?

Answer. This problem is still under investigation. The problem has been isolated to the Advanced Conventional Remote Interface Unit (ACRIU) which is located in the F–16 Pylon, not in the missile. This unit passes the missile launch command from the F–16 to the TSSAM missile. The aborted launch does not appear to be TSSAM related and, therefore, should not be assessed against TSSAM reliability.

Question. Delays in the start-up production will likely have some impact on the subcontractor base. Have you quantified the potential risks or cost of the delay on the program? What about the impact on the subcontractors?

Answer. Our production estimate includes the cost of some cold starts based on the current production scenario. Any other slips will cost about $2 million per month excluding the cost of requalification.

If other delays occur in the program, the JSPO anticipates some subcontractor requalification efforts will result in additional cost and schedule impacts. The program office has estimated that up to a year delay will increase the production estimate between $65M and $125M.

Question. Have the criteria which the Air Force plans to use to move ahead with milestone decisions remained fixed over the life of the program?

Answer. No. The exit criteria were established early in the program. As the schedule moved right and the requirements changed (i.e. deletion of launch platforms, changes in submunition variants, etc.), the criteria have been updated. OSD and Northrop have been involved with the establishment of and changes to these criteria.

Question. Are you proposing to direct the contractor to stop the flight test program until more ground testing is complete? How much delay do you expect, and does the contractor agree with the merit of taking that approach?

Answer. The Department has taken no official or contractual action on stopping the flight test program. We have established an independent team to look at Northrop's flight test process. To date all initiatives have been mutually agreed upon and within the scope of the current contract.

Question. What are the current alternatives to TSSAM to support our future smart weapons needs, especially for our conventional bomber strategy?

Answer. At this juncture, the only alternative for the bomber force is the conventional air launched cruise missile. However, unlike TSSAM it does not have the hard target kill capability, survivability, and high probability of arrival needed to attack high value, heavily defended targets. Furthermore, this capability is only available from the B–52. The Air Force has no other stand-off capability, at this range, at this time.

Question. It is my understanding that during long lead basically the only things being procured are tooling and test equipment, some process development, and parts. Do you believe that any of these items represent a high risk either from a reliability of a performance aspect?

Answer. No. None of the items being procured in long lead are considered high risk. Acquisition of the Radar Antenna Verification System (RAVS) test equipment, is a medium schedule risk.

Question. It is my understanding that of the seven TSSAM test failures, four occurred more than two years ago. Of the three more recent failures, could you tell us how many affect the B–52 CEB variant configuration?

Answer. None of the three most recent failures invoved the CEB variant. However, one of the failures is relevant to the CEB variant because of common subsystems within the variants. The last Navy failure was caused by a loose screw in the fuel pump housing assembly. This fuel pump is a common component between all variants.

Question. What was the result of the recent Production Readiness Review conducted for the CEB variant? Has a production facility been identified by the contractor, and is it an adequate facility to produce TSSAM?

Answer. The incremental production readiness review (PRR), held in September 1993, resulted in an overall rating of yellow with concerns being in the areas of manufacturing operations, quality assurance, configuration data, subcontract material and program management. Corrective action plans are being developed to address these concerns.

The TSSAM will be produced at the state-of-the-art Northrop, Perry, Georgia facility. Three additional buildings (paint facility, container storage & repair facility and an anechoic chamber) will be required for TSSAM. Construction of these additional buildings is planned to be complete in time to support current production schedules. The Perry facility is more than adequate for TSSAM production quantities.

Question. It has been told that the CEB variant recently completed one lifetime of reliability growth testing. Were any major problems identified during that testing? Have the results of that testing been incorporated into the production design?

Answer. There were some minor problems found during the first lifetime testing such as bracket failures, engine exhaust cracks, chafted wiring and loose bolts. These have been addressed and appropriate corrective actions have been taken.

[CLERK'S NOTE.—End of questions submitted by Mr. Dixon. Questions submitted by Mr. Young and the answers thereto follow:]

INTERCONTINENTAL BALLISTIC MISSILE SYSTEM

Question. Ms. Druyun, General Hawley, in spite of what you read in the newspapers, here at the committee, we are hearing that the former Soviet Union is a long way from destroying their current ICBM system. By the year 2003, the Minuteman III will be the only land based ICBM in our inventory. The missile has 1960's era guidance electronics. You have a plan to fix that with a life extension program that includes a guidance replacement program as well as remanufacture of the solid fuel motors. After the year 2003, our bomber fleet will be largely conventional leaving us with Minuteman III and Trident as our nuclear deterrent. Are you comfortable with the progress that is being made on the Minuteman III upgrades?

Answer. Yes. We have a detailed plan to enhance and sustain the Minuteman III through the year 2020. This plan was outlined in the Minuteman Life Extension Report that was provided to Congress by DoD in July 1992. This plan will provide a needed and cost effective military capability now and well into the future at very low risk.

Question. Last year, the GAO suggested that the program was premature and should be slowed down. What is your view of the GAO assessment?

Answer. We do not and did not agree with the GAO assessment that some of the Minuteman service life extension programs may be premature and should be slowed down. DoD formally responded to the GAO and non-concurred with their assessment.

ICBM FORCE

Question. The results of the Nuclear Posture Review will not be available until later this year, perhaps after we markup our bill. What is your view on the make up and importance of the current ICBM force?

Answer. The ICBM force plays a unique role in our nation's security. They provide cost effective day-to-day deterrence and should there be a strategic nuclear exchange, the ICBMs have a prompt response capability. With the Minuteman (MM) IIs being deactivated, the current mix of MM IIIs and Peacekeepers provides a formidable force. During START II implementation, we plan to retire the Peacekeepers, our newest land-based missile. That is why it's imperative we fund the Minuteman III life extension programs, which will keep 500 single reentry vehicle MM IIIs reliable and effective through 2020.

C–17 OPERATIONAL RESTRAINTS

Question. The C–17 has had its share of development problems by your own admission. It is a very important key to solving our lift problem which according to previous testimony this year is even more serious than we thought. You have six aircraft in the test program and five that have been delivered to the operators at Charleston, South Carolina. What operational restraints do you have on those aircraft that are out there flying operationally?

Answer. The initial squadron operations period that began with the first aircraft delivery to Charleston Air Force Base (AFB) in June 1993, is primarily dedicated to training of flight and maintenance crews in preparation for initial operational capability (IOC) scheduled for January 1995. The aircraft at Charleston AFB are currently performing some C–17 missions. Operational airlift sorties is one of the missions not yet released to Charleston AFB. Capabilities release and aircraft configuration determine which C–17 missions can be performed. As the aircraft advances through concurrent test, production, and deployment, capability is released incrementally corresponding to satisfactory test results, analyses and publication of aircrew operating manuals. Several major capabilities were released to the C–17 on 28 Mar 94, including overseas, formation and single-ship low-level flight, air refueling, combat offload, and 180-degree "three-point" or "star" turns requiring routine aircraft backing, a capability unique to the C–17 among strategic airlifters. Aircraft retrofit programs ensure aircraft configuration matches released capability requirements.

Training missions conducted at Charleston AFB have restrictions on center of gravity and landing weather minimums. Until completion of high angle of attack testing and upgrade of flight control software, C–17 aircraft at Charleston AFB are restricted to flight with a forward center of gravity. Weather minimums for approach and landing are restricted until approaches and landings are accomplished in similar weather during flight test. It is currently projected that these and other restrictions will be cleared in time to complete training for IOC.

Question. Are there missions they could not fly today because of any operational restraints on them?

Answer. Flight testing is not complete on tactical operations such as airdrop, small austere airfield operations, tactical low-level flight, or low-altitude parachute extraction system (LAPES) operations. These missions are being flown by the test force, but will not be flown by the operational crews at Charleston until the testing and analysis are complete. As testing of these capabilities is completed through the end of the flight test program, the operational restrictions will be lifted. Restrictions on airdrop and tactical low-level flight are scheduled to be lifted in early fall 1994. LAPES and short austere airfield (SAAF) steep approach restrictions will be lifted in late fall 1994. The operational aircraft and crews will be capable of performing these additional missions by initial operational capability (IOC) scheduled for January 1995.

Question. If we were required to fight two MRC's right now, what would be the role of those five aircraft that are in the inventory?

Answer. The five C–17s at Charleston AFB are currently being used to train maintenance and aircrew members for declaration of initial operational capability, scheduled for early 1995. As a concurrent test and production program, individual capabilities (such as cargo weight and balance, airdrop, air refueling, low-level, etc.) are released only after successful test results and analysis. This time phased capability release currently limits the C–17s contribution if a dual MRC scenario occurred today. Nonetheless, the Air Force would utilize the C–17s in the most effective capacity to safely support the airlift requirements within the scope of certified aircraft capabilities and existing enroute logistical support.

(CLERK'S NOTE.—End of questions submitted by Mr. Young. Questions submitted for the Record and the answers thereto follow:)

LAND BASED MISSILES

Question. After Peacekeeper ICBMs retire at the end of the decade, the Minuteman III will be the only land based element of the nuclear Triad on day-to-day alert. The Air Force plans $4.8 billion of upgrades to the Minuteman III missile to prolong its life to the year 2020. Minuteman III is an early 1970's vintage weapon. It is true that today the Air Force aims all its nuclear missiles at fictitious targets in the ocean, as a gesture of good will towards states of the former Soviet Union?

Answer. No, not yet. However, both Air Force and Navy nuclear missiles will soon have something other than actual former Soviet Union targets loaded day-to-day in targeting computers, as a result of the United States and Russia January 1994 Moscow summit. In order to implement the Moscow summit declaration on detargeting, the Secretary of Defense shall ensure that U.S. ICBMs and SLBMs are not targeted on any country on a day-to-day basis by 30 May, 1994.

Question. How much manpower would be saved if the Minuteman III missile were to be retired?

Answer. We would project the following savings: 988 officers; 4144 enlisted; 112 civilians; for a total of 5244.

Question. How much additional manpower would be needed by the Navy on its Trident submarines to assume this mission?

Answer. It would be inappropriate for us to comment on Navy manpower. However, the ICBMs provide unique capabilities which no other leg of the TRIAD can provide. Additionally, ICBMs incur the lowest operating costs of the strategic nuclear systems.

Question. What is the annual cost to operate the Minuteman III force?

Answer. According to the July 92 OSD report to Congress on Minuteman III life extension, the annual cost to operate the Minuteman III weapon system in FY92 dollars is $631 million. Inflated to FY94 dollars, the figure is $678 million. This includes military pay, depot maintenance, sustaining investment, sustaining engineering, direct cost, and indirect cost.

Question. Is the concept of a nuclear triad still absolutely critical from a strictly warfighting (vice political) view?

Answer. Yes. The TRIADs synergy provides the most effective nuclear balance while protecting against unexpected failures in any single leg or new technology breakthrough. The TRIAD provides maximum flexibility for war planners to cover the entire spectrum of conflict. At the same time, it provides maximum stress to an adversary's war planning by complicating the options he must consider if contemplating an attack. However, the TRIAD is most important for the deterrent value it provides, which for the past forty-plus years has precluded us from having to demonstrate its warfighting attributes.

Question. Please place into the record the fiscal year 1995 funding, total FYDP, "to-complete", production cost, and total cost for each offensive ICBM program by appropriation, fiscal year, R–1/P–1 line item and project.

Answer. The following information has been extracted from P–1, R–1, P–3 and Descriptive Summary Exhibits per the FY95 President's Budget. Dollar amounts are in millions. It pertains to only Minuteman mod and life extension efforts; Peacekeeper has no RDT&E and minimal procurement funding in the President's Budget. Total program costs include years prior to and after FY95–99. Some efforts are of a continuing nature and completion costs are depicted as "Cont" with totals "To Be Determined or TBD"

PROJ	PROGRAM	APPR	R-1	FY95	FY96	FY97	FY98	FY99	TO COMP	TOTAL PGM
010123F	Minuteman Sqns	3600	128	151.675	173.409	107.677	4.747	4.882	252.898	1091.397
133B	Rapid Execution and Combat Targeting	3600	128	21.792	4.092	0	0	0	0	293.097
3085	Guidance Replacement Program	3600	128	100.383	102.016	52.621	0	0	60.878	452.2
4209	Long Range Planning	3600	128	3.627	4.521	4.545	4.747	4.882	Cont	TBD
4210	Propulsion Replacement Program	3600	128	25.873	62.78	50.511	0	0	192.02	346.1
			P-1							
LGM-30	MM III Modifications	3020	16	18.3	159.2	355.3	477.7	394	Cont	TBD
T5036	Removal of MESP Lithium Batteries	3020	16	0.1	0	0	0	0	0	2.9
3454	Dual Frequency MEECN Receiver	3020	16	12	23.4	3.7	1.3	0	0	92.8
5007A	MM III DeMIRVING	3020	16	4.7	0.3	0	0	0	0	21.5
99999X	Low Cost Modifications	3020	16	0.6	1.5	1.7	0.2	0.1	Cont	TBD
T5037	ICBM Power System Modification	3020	16	0.9	0	0	0	0	0	6.6
3413	Rapid Execution and Combat Targeting	3020	16	0	16.9	0	0	0	0	324.5
13503B	MM III Guidance Replacement Pgm	3020	16	0	116	296	290.2	236.4	245.4	1184
5053	MM III Propulsion Replacement Pgm	3020	16	0	0	43	181.6	155.9	1691	2071.5
5035	G&C Freon Chiller Mod	3020	16	0	0	3.8	1.3	1.6	0	6.7
5037	Mod 7 Flight Telemetry	3020	16	0	0	2	0	0	0	2
5038	Mod of Brine Chillers R-5	3020	16	0	1.1	1.1	0	0	0	4.7
5062	IPD Processor	3020	16	0	0	4.0	3.1	0	0	7.1

FIXING THE B–1 BOMBER

Question. The Air Force envisions spending $2.7 billion to upgrade the B–1B bomber. Your statement indicates that "with the B–2 fleet capped at 20 aircraft and the B–52 force reductions underway, the B–1 will deliver the lion's share of conventional weapons." In addition, the Air Force plans to make the B–1B "the primary conventional bombers for the 21st century." The budget requests $74 million for B–1B R&D. How relevant is this capability, given that the aircraft were not used in Operation Desert Storm?

Answer. The B–1 was not used in Desert Storm because the Mk–82 500 pound bomb was not yet fully certified at the time. Additionally, operational units were not fully certified for conventional operations. Their primary role was nuclear deterrence. Today, B–1s provide over one third of the total bombers apportioned to theater commanders. B–1 units have trained heavily in conventional scenarios since 1992 and have developed significant experience in deployed operations. While the B–1 remains limited to area, soft targets due to the fact that it is limited to employment of the Mk–82 500 pound bomb, theater taskings will increase as additional capabilities are fielded. For example, the B–1 will obtain the capability to employ cluster munitions (to include Sensor Fuzed Weapon) in FY 96. Potential targets assigned to the B–1 will increase accordingly. Therefore, the most pressing need remains fielding planned Conventional Mission Upgrade Program (CMUP) improvements to include precision weapons capability. The FY 95 R&D budget of $74.1 million is crucial to this effort.

Question. Of the 100 aircraft which were built, how many of them are now considered to be operationally useful on a day-to-day basis?

Answer. There are now 95 B–1s in the Total Active Inventory (TAI). Four aircraft were lost in accidents and one aircraft is now designated as a ground trainer. All 95 B–1s are operational, rotating through the normal cycle of flying and periodic maintenance and modifications. This 95 aircraft fleet supports the requirements for a Primary Aircraft Assigned (PAA) of 84 B–1s. The Air Force is funded for aircrews, maintenance and flying hours to meet the operational commitments of 84 PAA. In FY 1995, the PAA will be reduced from 84 to 60, with the remaining aircraft in test, backup inventory, or attrition reserve. While these aircraft will not have aircrews or flying hours specifically allocated, they will receive maintenance and modifications, and rotate into daily flying operations. For FY 1995 and beyond, the B–1 fleet is planned to remain at 95 aircraft in the active available inventory.

Question. What has been done to the electronic warfare system of the aircraft to make it a viable bomber?

Answer. The ALQ–161A system on B–1 remains in its initial configuration, with hardware configuration frozen since 1986. Planned major modifications to this system were developed but not procured, in accordance with congressional direction. Funds requested in FY 90, FY91, and FY92 for major improvements were denied. Software improvements and a modification to improve the 1122 antenna have been accomplished. Some cost effective reliability and maintainability modifications are planned to the fielded system.

Turning toward the conventional mission for the B–1, the Air Force plans to upgrade the ECM system for the more robust and mobile threats expected in the conventional arena. The majority of the work to date has been to prepare to enter risk reduction and engineering and manufacturing development phases of the program.

In 1992 the Air Force formalized its Concept of Operations for the B–1's conventional missions, along with new ECM requirements. The Air Force conducted several in-depth requirements studies and reviewed seven contractor proposals. Subsequently, these studies and the industry proposals were independently validated by the Institute for Defense Analysis for Congress. In 1993, the Under Secretary of Defense for Acquisition approved the acquisition strategy and the Department fully funded the budget. Rockwell International was selected as the prime contractor for development and integration for both advanced weapons and ECM. The program was stopped in November 1993, after Congress prohibited spending FY94 (and remaining FY 93) RDT&E funds to improve B–1 ECM. The Air Force plans to restart the ECM program in FY 96 and seeks needed Congressional support for this important program.

Question. Can the ECM system be fixed at all?

Answer. Rather than "fixing" the current ECM system, the Air Force seeks a total system solution which focuses on the demands for B–1's new conventional tasking. Specifically, the B–1 ECM Upgrade program must provide improved situational awareness, added high altitude countermeasures, and better supportability features. Several options are available which could meet current requirements without undue risk or cost. A number of potential contractors are interested and suggested approaches range from entirely new systems to solutions based on major upgrades to the existing system.

Question. How much has the nation invested in the B–1B to develop and build it, train its pilots and maintenance crews, and to stock an inventory of spare parts?

Answer. The original program to develop and build 100 B–1 bombers was budgeted at $20.5 billion (in base year FY81 dollars), obligating $20.1 billion dollars to date. Initial spares were purchased as part of the baseline. It should be noted that the B–1 Conventional Mission Upgrade Program (CMUP) is a new acquisition effort separate from the baseline program; the original nuclear baseline was closed in April 93. Funds to train aircrews and maintenance crews are not investment items and are funded out of Operations and Maintenance (O&M/Appropriation 30). An historical track of these expenditures from FY86 (Initial Operational Capability) through the last full fiscal year is provided below.

Operations and Maintenance [1]

[In millions of dollars]

Fiscal year:	
1986	16.4
1987	70.0
1988	92.8
1989	164.2
1990	195.4
1991	233.6

1992	206.6
1993[2]	355.5

[1] O&M also includes funds for non-training-related areas including sustaining engineering, civilian pay, base communications, etc.

[2] FY 93 figure reflects decentralization of Depot Level Repairables (DLR).

Question. The budget requests $74 million in fiscal year 1995 for B–1B R&D upgrades. How will these funds be used?

Answer. The request for the B–1 in fiscal year 1995 includes $71.6M for conventional weapons integration and $2.5M for preparation to restart the program to upgrade the Electronic Countermeasures (ECM) system.

The funding for conventional weapons upgrades includes Cluster Bomb Unit (CBU) and Joint Direct Attack Munition (JDAM) integration, as well as efforts required for JDAM delivery and conventional employment of the B–1. Related integration work includes the Mil-Std-1760 electrical interface, Global Positioning System (GPS), and the anti-jam radio, for effective conventional employment of the B–1.

Question. Provide for the record a detailed breakout of the $2.7 billion B–1B upgrades by appropriation, fiscal year, and project.

Answer. The $2.75B for the Conventional Mission Upgrade Program includes $1.58B for conventional weapons integration and $1.17B for the Electronic Countermeasure (ECM) upgrade program. The table below represents the entire cost of the B–1 CMUP.

TY$(M)	Prior	FY95	To go	Total
Weapons:				
3600	[1] 103.4	71.6	980.0	1,155.0
3010	0.0	10.1	413.5	423.6
3600	18.2	2.5	645.7	666.4
3010	0.0	0.0	504.4	504.4
Total CMUP	[1] 121.6	84.2	2,543.6	2,749.4

[1] Does not include $8M for Relative Targeting System demonstration which is not considered a CMUP cost.

TRI-SERVICE STANDOFF ATTACK MISSILE (TSSAM)

Question. TSSAM has been a very troubled program, and during the past 6 months has perhaps hit a new low point with a series of unsuccessful flight tests. The fiscal year 1995 budget requests $607 million for TSSAM, of which $230 million is for R&D. As has been the case since fiscal year 1988, the ever-optimistic Air Force continues to assert that the program is now ready for production. As the Air Force's acquisition executive, what are you doing to fix this program?

Answer. I have reviewed the program and evaluated several options available to us to improve the program's readiness for production. My staff and I have implemented several actions that we believe will go a long way toward achieving this goal.

First of all, we have instituted monthly reviews with the Northrop CEO. We believe this high level management attention will be invaluable toward getting this program back on track. Special emphasis is being placed on design stability and verification, the quality activities/indicators, subcontractor management and schedule compliance. Trends within the last six weeks tend to be positive; however, sustained performance will be the key.

Secondly, we have added a new emphasis on Design Maturity, including the Engineering Change Order evaluation process. We are considering additional ground testing, in order to build confidence for flight test. We have directed the evaluation of critical processes, to include subcontract management, flight readiness reviews, engineering design validation, and quality assurance. Our event driven production decision process was revalidated to ensure TSSAM will be ready to enter production.

Question. How many times has this program's schedule been revised, and how is the contractor performing against the most recent schedule? How far behind is the flight test schedule? How far behind in engineering/manufacturing?

Answer. The contract schedule has been changed three times; in June of 1991, July of 1991, and December of 1992.

The contractor is currently 7-months behind the flight test schedule. Per Northrop's current contract (December 1992), 17 of 25 scheduled tests have been flown.

Currently, the contractor is 6 months and 20 missiles behind on developmental manufacturing. According to the current schedule, Northrop should have manufactured 98 missiles for use in ground and flight testing. To date, 78 missiles have been completed.

Question. The original schedule was to develop the missile in 76 months. How many months are now expected?

Answer. The original 76-month schedule (plus two months of administration time) has been extended by 62 additional months, for a total of 140 months.

Question. Is is true that the contractors are over $1 billion beyond the government's liability on the TSSAM development contract? How can they recoup these costs?

Answer. The $1 billion is the program offices' estimate at the completion of the contract and includes the prime contract as well as estimates of the three major FPIF type subcontractors. This is broken out as follows: Northrop ($791M); Texas Instruments ($207M); GEC ($35M); and Pratt and Whitney ($21M). Northrop's projected loss will be reduced by the value negotiated for the sensor request for equitable adjustment and the termination and withdrawal of the Army variant. The remaining losses will not be recouped during EMD. The contractors depend on missile production for any profit.

Question. The budget requests $82.5 billion for Army TSSAM termination costs. What value does the government get for this investment? What do you call this program now that it is no longer tri-service?

Answer. The Army FY95 budget request is $82.5 million for TSSAM termination and technology transfer. The total termination funding is $42.5M in FY 94, $82.5M in FY 95, and $1.5M in FY 96. The government will receive technology transfer of information for the Brilliant Anti-Armor Submunition (BAT) integration onto the Army Tactical Missile System (ATACMS) and other technologies for future Army systems. The contract termination for convenience effort includes the Army portion of the TSSAM contract with Northrop, three additional Army unique contracts, and shut down of the Army TSSAM offices at Wright/Patterson AFB OH and at the Redstone Arsenal AL.

The program name will continue to be TSSAM for the foreseeable future, until the Army termination activities are further along.

Question. In what year does R&D on this program end?

Answer. R&D funding for TSSAM is rapidly reduced through the FYDP and ends in FY 99. Additional funding beyond the current EMD end date of December 1997 (FY 98) is required to closeout the government's portion of the EMD program and to support integration of TSSAM on to the B–1 and F–16 aircraft as they become available.

Question. How much development and testing remains until the Air Force is assured that the missile works?

Answer. The development portion of the program is seventy-three percent complete based on contract Estimate At Completion (EAC). Forty-five percent of the developmental free flight testing is complete and twenty-four of forty-two subsystems have completed qualification testing. System level qualification and dedicated operational flight testing remain to be completed.

Question. Which Navy aircraft were originally intended to carry the missile, and which are now currently planned to do so?

Answer. The Navy originally planned for the A–6, F/A–18 and A–12 to carry TSSAM. With the cancellation of the A–12 and phase out of the A–6, the F/A–18 remains the only Navy launch platform.

Question. The Committee understands that the Air Force is concerned about the contractors "poor metrics" for its internal management of this program. What is the problem, and what is the solution?

Answer. Northrop's internal "metrics" have not helped them identify and avoid the root causes of today's problems. The design stability is not fully understood and we feel that quality at both the system and subsystem level is not being accurately measured.

We have expressed dissatisfaction with Northrop's metrics and seek to add additional metrics which will correctly focus management attention. Examples include a thorough examination of the causes driving engineering changes and an analysis of the CEB variant system maturity.

Question. During conference on the fiscal year 1994 Defense Appropriations Act, the Committee was forced to agree to provide $160 million for TSSAM production in 1994. Will the Air Force in fact award any of these production funds during fiscal year 1994?

Answer. Yes. As stated earlier, Northrop has experienced a series of manufacturing and schedule problems which have prevented them from completing the exit criteria, which is required prior to their entry into long lead. When we are satisfied there has been adequate progress and we have more confidence in Northrop's readiness, we will request permission to enter into a long lead contract. We are projecting that Northrop will meet these criteria by Aug 94. USD(A&T) wishes to further evaluate the missile's design maturity prior to scheduling the Defense Acquisition Board. To ensure that we can stay on track, we will be requesting that approximately $35M be reprogrammed from production to the RDT&E account in order to initiate three more cost reduction initiatives that we had planned to start after the production funding became available.

Question. Can TSSAM now be used to hit a moving ship?

Answer. We will provide this information to Congress under separate cover.

Question. Please put into the record a table which shows all TSSAM costs, to include platform integration. Show: total government funding through fiscal year 1994, the amount requested for fiscal year 1995, the total amount included in the FYDP, the "to-complete" amount, and estimated missile production and platform integration funds by appropriation and R–1/P–1 line item. Include Army and Navy costs.

Answer. See attached chart for this information.

SHOW ALL TSSAM COSTS, TO INCLUDE PLATFORM INTEGRATION.

Appropriation	FY94 & PRIOR	FY 1995	FY96 - FY99	TO COMP	TOTAL
RDT&E (3600)	2100.5	81.1	160.3		2341.9
Msl Proc (3020)	171.1	376.9	1804.0	4658.8	7010.8
Acft Proc(3010)*	20.7	0			20.7
Other Proc(3080)	26.1	0			26.1
MILCON (3300)	14.9	0	29.2		44.1
O&M (3400)	0	0	106.1	3240.1	3346.1

*$30M OF 3010 FUNDING IS REQUIRED IN FY96 DUE TO CONGRESSIONAL CUT IN FY94.

Navy

Appropriation	FY94 & PRIOR	FY 1995	FY96 - FY99	TO COMP	TOTAL
RDT&E (3600)	1398.2	66.7	131.9		1596.8
Msl Proc (3020)	0	0	199.3	877.0	1076.3
O&M (3400)	0	0	32.0	947.6	979.6
MILCON (3300)	6.9	0	8.2		15.1

Army

Appropriation	FY94 & PRIOR	FY 1995	FY96 - FY99	TO COMP	TOTAL
RDT&E (3600)	821.4	82.0	8.2		911.6
Msl Proc (3020)	0	0			
O&M (3400)	0	0			
MILCON (3300)	0	0			

Integration Costs by platform:

NOTE: The following are the program office estimates of current program costs. Launch platform integration is not fully broken out.

	TSSAM funded		**Platform funded**	
B-52:	$235.4 (3600)	$30.0 (3010)	ALL FUNDED THROUGH TSSAM	
F-16:	$72.4 (3600)		TBD - FINAL INTEG POST FYDP	
B-2:	$33.3 (3600)		$250.2 (3600)	$5.2 (3010)
B-1:	$4.8 (3600)		$310.0 (3600)	$40.2 (3010)
F/A-18	$30.5 (3600)		NOT AVAILABLE	

F–22 FIGHTER AIRCRAFT

Question. The fiscal year 1995 budget requests about $2.5 billion for continued development of the F–22 fighter aircraft. The total cost of the F–22 program is now $71.6 billion for 442 aircraft, or about $162 million each when all costs are considered. Mrs. Druyun, the F–22 Selected Acquisition Report submitted to Congress last week shows that the Air Force anticipates the F–22 contract to be $806 million over the target cost of $10.6 billion and the engine contract to be $300 million over its target cost of $1.6 billion. Explain the apparent overruns.

Answer. The $806M delta between the program manager's estimate-at-completion ($11,364.8M) and the Lockheed current contract target price ($10,559.3M) is composed of three elements.

The first element is $644M that is attributable to future award fee. Contract target price includes target cost plus a 4 percent profit fee. Award fee is not included in the contract target price; it is awarded to the contractor based on the government's assessment of contractor performance. The maximum government liability is 9 percent of target cost.

The second element is $60M of known cost growth, for example, efforts to control aircraft weight.

The final $102M is a projection of potential cost growth across the remaining program using current cost and schedule performance efficiencies. This projection is weighted at 80% of our historic cost performance and 20% of our historic schedule performance efficiency.

The $300M delta between the program manager's estimate-at-completion ($1,866.3M) and the target price on the Pratt & Whitney contract ($1,566.0M) is also composed of three elements.

$75M is for future award fee.

$180M is known cost growth, for example, the turbine section redesign.

$45M is the program manager's estimate of potential cost growth.

Question. Why have estimated production quantities been reduced by one third?

Answer. The reduction in quantity from 648 to 442 reflects the overall force reduction from 26.5 Fighter Wings to 20 Fighter Wings. Air Superiority forces constitute approximately 20% to 25% of the fighter force structure. When budget pressures drove the total force structure below 26.5 wings, F–22 took a proportionate share of the reduction.

Question. Testing on the first 3 developmental engines revealed lower than expected performance and higher than anticipated turbine blade stress. Please explain the problem and its significance.

Answer. The F–22's F119 engine is meeting all performance goals except for Thrust Specific Fuel Consumption (TSFC). TSFC is a basic measure of engine efficiency, and directly impacts aircraft range. The TSFC shortfall is primarily a function of inefficiencies in the turbine section.

If efficiency shortfalls are not corrected, the possibility exists that the aircraft may miss its specification for subsonic cruise range due to higher than anticipated fuel consumption.

A second area of concern is higher than anticipated turbine stress. This stress is caused by aerodynamic interaction between the high and low pressure sections of the turbine. High pressure turbine blade exit shock waves are reflecting back from the low pressure turbine vanes and generating a vibratory response. It is important that the F–22 program address this issue because it adversely effects engine durability.

As a result of these deficiencies, the F–22 Program Office and contractor have initiated an aggressive turbine redesign program. This redesign will address both turbine stresses and the current TSFC shortfall.

The Air Force anticipates that the planned improvements to the engine will return it to within 2% of the TSFC goal, plus or minus 3%. This level of efficiency will restore a modest margin to the F–22's APB range requirement.

Question. The Air Force has convened a "murder board" for F–22 weight. What is a "murder board," who is on it, and what is the apparent F–22 weight problem which causes this concern?

Answer. After the April 1993 Preliminary Design Review, air vehicle weight gradually began to grow as the F–22's design matured toward Critical Design Review. Weight growth is a challenge to any aircraft design effort and it is imperative for the F–22 program to maintain positive control over weight throughout the development process. To stringently control weight, the system program office (SPO) and the contractor convened a "murder board" of senior technical personnel from the contractor, the SPO and the user (Air Combat Command). The primary purpose of this board is to consider program cost and schedule impacts versus weight reduction options. The board centralizes all weight reduction activities in one location and enables the contractor to focus efforts only on the weight reduction activities that do not compromise F–22 capabilities or add undue technical risk to the program.

Vigorous efforts of the F–22 weight murder board have already identified substantial real and potential weight savings. Additional savings are expected in the future.

Question. Two developmental aircraft and 6 developmental engines have been deleted from the F–22 program. What is the impact on the program's technical risk, and its ability to achieve planned milestones?

Answer. F–22 technical risk has not changed with deletion of the EMD aircraft and engines. The six development engines were flight test engines associated with the two deleted aircraft (four installed engines and two spares). The development aircraft and engines were deleted in order to accommodate FY 93 Congressional funding reductions. The nine remaining developmental aircraft will be delivered in the same total time as the original eleven and will accomplish the same amount of flight test, albeit over a longer period of time. The Air Force extended the flight test period, as a part of the 1993 rephase, to accommodate the reduction in test assets. The remaining test assets, 9 aircraft and 27 engines, are adequate to complete testing under the current schedule.

Question. The Air Force recently decided to give the F–22 an air-to-ground capability. Please explain what is being done and how this capability compares to an F–15E, F–16 or F–111 aircraft.

Answer. The Advanced Tactical Fighter and its successor program, the F–22, have always had a requirement for an inherent air-to-ground capability. Current design work on the F–22 insures that each aircraft will have a resident capability to carry two 1000lb Joint Direct Attack Munitions (JDAMs) internally. In addition, the F–22 will still be able to internally carry two AIM–120 and two AIM–9 air-to-air missiles.

The F–22 is being designed as an air superiority aircraft, and the incorporation of JDAM in no way impairs its air-to-air capability. Once air superiority is achieved in a campaign, the joint commander can elect to employ some of the F–22 force for air-to-ground missions, thus making more effective use of available air assets. The F–22 will employ JDAM using its stealthy characteristics and supercruise abilities to penetrate enemy airspace with significantly less risk than current conventional aircraft.

These planned missions of the F–22 differ from those of the F–15E, F–16 and the F–111. Designed primarily for the air-to-ground role, these non-stealthy aircraft carry considerably heavier bomb loads than those planned for the F–22. In a conflict, these aircraft will carry out the overwhelming majority of the air-to-ground attack missions and will operate under protection of the air superiority provided by the F–22.

Question. When this program started, the original IOC was forecast to occur in 1995. What is your current estimate for IOC?

Answer. The current forecast for F–22 IOC is May 2004.

JOINT ADVANCED STRIKE TECHNOLOGY (JAST) PROGRAM

Question. The Air Force requests about $101 million to initiate its share of the $2 billion Navy-Air Force program for tactical aircraft research. Mrs. Druyun, please explain the JAST concept and strategy.

Answer. The JAST Program is the DoD focal point for defining affordable next generation strike weapons systems. JAST is a joint program (USAF, USN, USMC) with no lead service. JAST is a technology demonstration program, not an acquisition program. It will create the building blocks for affordable, successful development of future strike systems.

The JAST Program will use joint integrated product teams of warfighters and technologists to transition and demonstrate affordable, high leverage technologies and manufacturing processes. These opportunities will optimize commonality and reduce the life cycle costs of future strike systems. The program will provide an analytical process by which operators will jointly define and iterate these building blocks with technologist teammates using the strategy-to-task-to-technology process.

JAST will consist of three phases. The near term focus (next 12 months) is on concept exploration. Additionally, concept definition initiatives will span the next one to three years. This will be followed by concept demonstration in the far term.

The combined USAF/USN FY 1995 funding request supports completion of concept exploration studies, and initiates concept development in the following areas: air vehicle; manufacturing and producibility; propulsion; avionics; weapons integration; supportability; strategy-to-task-to-technology analysis; and strike weapons systems concepts.

Question. What does the Air Force hope to get out of JAST?

Answer. The USAF is counting on the JAST Program to mature and transition the critical technologies that will result in an affordable next generation weapon system to replace the multi-role fleet in the 2010 time frame. The JAST Program efforts are essential for the U.S. to maintain its tactical air technological superiority within national budget constraints.

Question. Does the Air Force want to do JAST, or was it forced on you by OSD?

Answer. The service well recognizes that the nation cannot afford "business as usual" in maintaining our tactical air capability. The USAF strongly supports the JAST Program and views it as the only viable path to affordably replace aging strike assets with next generation aircraft.

Question. Is the JAST program essential to the Air Force?

Answer. Yes. The USAF views the JAST Program as the only viable path to affordably replace aging strike assets for the USAF, USN and USMC.

Question. Last week the Committee received the Electronics Industries Association 10-year forecast, which makes the following observations about JAST:

"We remain skeptical of JAST"

"In our view, it's mainly a 'kick-the-can' means to put the best possible 'face' on the fact that DoD barely can afford developing the F–22 and the F/A–18E/F * * *"

"We see JAST as little more than a 'make-work' project for some engineers * * *"

"OSD and the JAST program office meddling will likely screw up an otherwise well-run ARPA ASTOVL program."

"The $2 billion now planned for JAST probably could be better employed to leverage our present force of combat aircraft."

Is industry wrong in its assessment of the JAST program?

Answer. The DoD established the JAST Program out of recognition that the nation cannot afford "business as usual" in replacing multi-service tactical air assets. This is a new approach to DoD weapon system replacement. Many new ideas are met with skepticism initially. It is not clear when the research for the cited study was conducted; quite possibly it occurred in the very early stages of the program, before JAST's plans were well defined.

The JAST approach, however, is sound. JAST initiatives will be selected through a disciplined strategy-to-task-to-technology process using integrated product teams of warfighters and technologists. This permits the early cost and performance trades necessary to the identification of affordable solutions to warfighters' requirements. It ensures we spend our limited resources on technologies relevant to our operational needs.

The JAST Program is not interfering with the ASTOVL Program. JAST will assess the ASTOVL Program in the future as a candidate for one of its flying demonstrators. This assessment will be based on the ASTOVL Program's progress and its capability to satisfy the requirements of more than one service.

Question. Wouldn't the Air Force be better served by investing the $2 billion into a naval variant of the F–22, thereby raising the production run and lowering everybody's unit costs?

Answer. The Navy already studied a version of the F–22 to determine if it could meet their requirements. The NATF, however, was judged to have unacceptable carrier suitability. Additionally, the joint USN/USAF AFX program considered several designs that incorporated a considerable amount of F–22 technology. The F–22 and AFX programs were both active in the Joint Integrated Avionics Working Group in an effort to lower cost and risk through avionics commonality. The Bottom-Up Review, however, canceled the AFX program.

The AFX and F–22 derivative concepts, along with other ideas, will provide the JAST Program with an excellent starting point to begin conducting affordability and performance trade studies.

Finally, the JAST Program addresses more than just the Navy's requirement, its goal is to define the next generation of strike systems for the USAF and the USMC as well.

F–117 AIRCRAFT

Question. The budget requests no funds to develop improvements to the F–117 aircraft. General Hawley, please characterize how the F–117 aircraft performed in Operation Desert Storm.

Answer. The 37 TFW deployed with two squadrons of F–117A's, a total of 42 aircraft. The Wing flew 1296 combat sorties delivering more than 2000 tons of precision guided munitions. The stealth fighters were employed primarily against high leverage strategic targets: command and control bunkers, bridges, hardened shelters and weapons storage areas. The aircraft demonstrated its survivability and precision strike capability with a target hit rate of 80% while significantly limiting collateral damage. Overall the unit's mission capable (MC) rate during combat was 85.5% versus a peace time Command standard of 83%. The F–117A was the only aircraft in Desert Storm routinely tasked to attack high threat targets in the Baghdad area and after 1296 sorties, there were no combat losses.

Question. The aircraft manufacturer believes that the aircraft's engine can be upgraded (from an F–404 to an F–414) to provide more than a 70 percent increase in combat radius as well as afterburner capability. Is this true?

Answer. In the Lockheed F–117B proposal, they stated that the F–414 engine could replace the F–404. In fact, it could be viewed as necessary due to the increased weight of the F–117B over that of the F–117A. The F–414 engine can be fitted with an afterburner and the F–117B could have a range increase to approximately 1000NM. However, the range increase would be due to an increased fuel load in the F–117B and mission profile differences; not just an engine change.

Question. How much has the nation invested in the F–117 to develop and build it, train its pilots and maintenance crews, and to stock an inventory of spare parts?

Answer. In cumulative then year dollars through FY92 the Program Acquisition Cost for 59 aircraft (includes management, hardware, software, non-recurring start-up, allowance for changes, tech data, publications, contractor services, support equipment, training equipment, factory training, initial spares, RDT&E—for 64 aircraft, and facility construction) was $7.753B. Pilots and maintenance crews are treated as a pooled Air Force resource and are not accounted for as a direct expense to any single weapon system.

Question. What is the Air Force's assessment of the cost to develop the F–117B model a proposed by the manufacturer?

Answer. The Air Force has not conducted an assessment of Lockheed's F–117B proposal. The Air Force is reviewing alternative F–117A upgrades for potential Reliability, Maintainability, and Supportability as well as Survivability and Lethality enhancements.

Question. Would you say that the Air Force has adopted a classic "Packard Commission" approach to the F–117?

Answer. Basically, the Packard Commission dealt with acquisition reform and trying to do some rather significant overhaul of the whole acquisition system, streamlining for example. There was emphasis on clear command channels; stability in program management personnel; limited reporting requirements; small, high-quality staffs; constant communications with users; and realistic prototyping and testing. The F–117 acquisition did employ all of these tenets.

B–2 R&D

Question. The fiscal year 1995 budget requested $408 million for continued development and test of the B–2 aircraft, bringing the total estimated B–2 RDT&E cost to $24.7 billion. What problems have been found during testing, and are any of them significant?

Answer. No significant issues have arisen since we made our congressional certification last fall. The low observable issue has been resolved, the Block 30 (final) configuration has been defined, and all elements of the Block 30 configuration have been flight tested. Aft deck cracks were discovered earlier in flight test, but a fix was identified, and a redesigned aft deck was just recently installed on AV–2. Climatic lab tests were completed last December. They were overall successful, some minor problems were noted, but there were no show stoppers. Some minor issues have also been noted during flight test of the avionics. These have been typical flight test issues, nothing significant. Overall, the B–2 test program has been very successful, and has demonstrated the soundness of the B–2 design.

Question. The latest Selected Acquisition Report to Congress shows that the B–2 contract with Northrop is estimated by the Air Force to be $9.1 billion beyond the contract target cost of $11.1 billion—an 82 percent cost growth. How much of this cost growth is due to government changes, and how much is considered to be overrun?

Answer. The Selected Acquisition Report (SAR) which is referenced was prepared in December 1992. It is more appropriate to answer this question using the latest SAR, dated December 1993.

The initial target price developed in 1981 was $9.4 billion. In the most recent SAR, dated December 1993, the contract target price (also known as the current contract price) is shown as $10.6518 billion. The increase of $1.2518 billion from 1981 was due to authorized changes (such as MANTECH) initiatives, Defensive Management System, Armament System, Rotary Launcher Assembly, etc.). No distinction is made between contractor or government initiated changes. The decrease between the 1992 and 1993 current contract price was due primarily to contractual changes which occurred over the course of the year. The estimated price at completion by the contractor is currently projected to be $20.2905 billion. The difference of $9.6387 billion between the estimated price at completion by the contractor and the current contract price is due to reprogramming adjustments, which could be categorized as cost growth or overrun. Some examples of cost growth drivers include schedule stretch outs, reduced buys of aircraft, and the Boeing strike.

Question. Is the R&D program under control and going smoothly?

Answer. Yes, most definitely. The decline in the FY95 PB request from FY94 RDT&E demonstrates we're wrapping up the development effort. The flight test program is proceeding according to schedule. Software development, avionics integration, and weapons testing are all holding to schedule. Significant program risk areas have already been evaluated, and results incorporated into the design. For example, all of the low observable fixes have been flight tested; the B–2 structures tests were highly successful and resulted in no significant changes to the structure; and the operational envelope has been cleared. We are right where we want to be at this stage in the program.

Question. "Travelled work"—where subcontractors must travel to the Northrop facility to assist in final assembly of the aircraft—used to be a big headache and a major cost driver. How much "travelled work" now exists on the B–2 program?

Answer. The first B–2 experienced over 200,000 man-hours of traveled work. We expect the production aircraft to have less than 25,000 hours of traveled work each. This represents a reduction of about 88%. The primary cause of traveled work was inefficiencies at the major subcontractors Boeing and Vought. Boeing's Outboard Wing Sections and Aft Center Sections and Vought's Intermediate Fuselage Sections were being shipped to the final assembly facility in Palmdale, CA in an incomplete status. Up to 900 Boeing employees and 300 Vought employees were temporarily assigned to Palmdale earlier in the program, to complete the work which was traveled to Northrop. However, the traveled work has been reduced to the point where there are no longer any Boeing or Vought employees on temporary assignment to Palmdale.

C–17 AIRCRAFT

Question. The fiscal year 1995 budget requests $221 million for continued C–17 test and development. The total cost of the C–17 program is now $21.4 billion for 40 aircraft, compared to the original estimate of $41.8 billion for 210 aircraft: the program unit cost for a C–17 has therefore grown 168 percent from $199 million each to $534 million each when all costs are considered. The contractor is $1.4 billion beyond the government's liability (contract ceiling) on the initial C–17 contract, which covers development and the first two production lots. How much of the settlement reimburses the contractor for this loss?

Answer. The increase in unit costs from a 210-aircraft program to a 40-aircraft program is due primarily to the decrease in quantity and the resulting recapture of capital investment across fewer aircraft.

The settlement does not reimburse the contractor for any specific losses. If approved, the settlement will result in an increase in the ceiling price of the development contract by $237 million for resolution of all contractor claims prior to the settlement. When combined with estimates of the Government's share of the other obligations documented in the settlement (extending the flight test program; implementing CAD/CAM, a Management Information System, and an Advanced Quality System; and resolving other long standing issues) the total financial commitment for the Government is approximately $348M. However, the settlement requires the contractor to invest approximately $454 million in the program and release the Government from all C–17 claims it may have as of January 6, 1994, whether filed or not.

Question. How many flight test hours have been accomplished on the C–17 aircraft?

Answer. As of 21 March, 1994, the 6 C–17 test aircraft at Edwards AFB, CA have flown a total of 802 missions and accumulated 2,934 flying hours.

Question. What will be accomplished with the FY95 R&D funds?

Answer. Settlement requirements aside, the funds requested will cover the government costs for completing the flight test program, complete the payments on the development contract, complete the Reliability, Maintainability and Availability evaluation, provide program office support, and provide for engineering changes that arise from the test program and initial operations.

Question. What problems have been identified from the C–17 program, and have "fixes" for each of them been identified and implemented?

Answer. The following are the significant problems and the fixes identified for the program:

Static Wing:

Problem.—On 1 Oct 92 the static article wing skin panels fractured and buckled on both wings at 124% of limit load versus the required 150%. An Executive Independent Review Team (EIRT) reviewed the incident and issued a final report on 26 Feb 93. The review team found that analysis error, optimistic design assumptions, and uneven pad loading contributed to the failure. A repair was developed and installed on the static test article and testing restarted. Two months after testing resumed, the left wing buckled for a second time (10 Sep 93). The failure occurred outboard of the engine pylons on the left wing at a local load of about 150% of limit load.

Solution.—McDonnell Douglas' repair for the first failure consisted of adding steel straps to the wing stringers through aircraft P–28 and enlarging the stringers on subsequent aircraft. Steel straps were incorporated into production on aircraft P–11. The EIRT concluded the fix was satisfactory. A second EIRT reviewed the Sep 93 incident and reported their findings and recommendations to USD(A&T) on 17 Oct 93. The EIRT concluded the wing met the 150% design limit load required in the contract specification and there was no need to retest wing upbending. McDonnell Douglas Corporation (MDC) agreed to pay nonrecurring costs associated with incorporating an enlarged stringer design into production as an enhancement of the original fix.

Flaps/Slats:

Problem.—Higher than anticipated temperatures occur on the flap and slat trailing edges and hinge fairings, due to exhaust impingement, causing localized skin buckling.

Solution.—Heat shields were installed as an interim solution to allow continued flight testing and minimize test impact; however, titanium flaps and slat skin sections were incorporated as a production fix in aircraft P–11. Earlier production aircraft will be retrofitted with titanium parts by Dec 94. Two test aircraft (P–2 and P–4) have been retrofitted with the titanium parts to allow completion of developmental and operational testing.

Range/Payload:

Problem.—Range/payload performance does not meet contract specification. Shortfall due to: design weight growth, thrust specific fuel consumption higher than expected, and baseline drag increase.

Solution.—The aircraft will meet all user minimum requirements even with the known shortfall. The System Program Office is working with MDC to incorporate low risk improvements to reduce shortfall. Air Mobility Command proposed, and the Joint Requirements Oversight Council validated, the key range/payload performance parameter threshold change to 110,000 lbs/3,200 nm from 160,000 lbs/2,400 nm (2,400 nm range based on a cold war requirement for East Coast-Lajes-Europe/West Coast-Hickam-Wake-Korea enroute structure). The new threshold is consistent with new national security policy and reduction in forward presence and reflects Major Regional Contingency (MRC)-East and MRC-West used in Bottom-Up Review.

Engine Performance/Cost:

Problem.—The Air Force began to directly purchase the Pratt & Whitney (P&W) engine as government furnished equipment on the C–17 beginning with P–11 (Lot IV) and spares for Lot III (total of 54 to date). Engines installed on T–1 and P–1 thru P–10 were purchased by MDC (total of 50). The engine does not meet the fuel consumption specification in the original contract between MDC and P&W.

Solution.—Engines purchased in future contracts (beginning with Lot VI) will meet a revised specification which allows fuel consumption to be 2.0% higher. Contracts for the engines will reflect lower unit costs than if the engines met the full spec. The Air Force has negotiated consideration from P&W totaling $23.9 million in recognition of the non-compliant engines and the spec relief to be granted. The aircraft is still projected to meet all the user's threshold (minimum) requirements that are affected by engine fuel consumption.

Fight Test Program Progress:

Problem.—Monthly flight rates and test point completion efficiencies were below planned values in early stages, and the 80 aircraft-month flight test schedule was unachievable.

Solution.—Air Force and MDC reviewed the test schedule from the bottom-up and rebaselined the schedule in Apr 93 to reflect realistic flight rates, test point efficiencies, unplanned demand, known work programs, and aircraft deployments. Since the rebaselined schedule was implemented, the program has tracked to plan or slightly ahead. The Defense Science Board recommended an additional extension to the flight test schedule to further reduce risk. The Air Force and McDonnell Douglas Corporation are negotiating contract changes to the flight test schedule which would provide for 138 aircraft-months and 14 additional aircraft-months in the form of options to the contract that would be paid for only if needed. In accordance with the settlement, the Air Force and McDonnell Douglas would split the cost of the flight test extension from the currently contracted 80 aircraft-months to as much as 152 aircraft-months.

Question.—In January a C–17 flight test aircraft experienced a "horizontal tail overload". Please explain what happened and its significance. What is the cost of replacing the tail section of this test aircraft, and what are the implications for the rest of the C–17 fleet?

Answer. On Monday, January 31, 1994, a C–17 flight test aircraft (P–1), experienced a structural overload condition on its horizontal tail during 100 percent flight loads testing at Edwards AFB, CA. The 80 percent flight load condition had been completed on a previous mission without incident. The test mission was intended to achieve 100 percent flight loads on the tail through performance of abrupt symmetrical pull-ups. During the final maneuver, the pilot was attempting to achieve a 2.0 G test load but overshot to approximately 2.3 Gs and experienced heavy buffeting on the horizontal tail during recovery to normal flight. The flight mission was terminated, and the aircraft returned to Edwards AFB uneventfully. The apparent overload was reported and initially estimated at 125 percent of design limit from real-time data monitoring. Previous static loads testing on the horizontal tail had reached 176 percent of design limit (the limit of the test fixture) without failure.

Upon visual inspection there was no apparent damage to the tail. Based on the initial test data, static strength test results, and inspection of the horizontal tail, the aircraft was released to fly. The aircraft flew five times following the test flight on which the overload occurred—no problems were experienced on any of those flights. Detailed analysis of complete flight test data, concluded about three weeks later, revealed portions of the tail, where data was not available from real-time monitoring, had been subjected to loads exceeding 150 percent of the design limit load, which is the ultimate load.

As a result, the horizontal tail has been replaced with one from later in the production line, at a cost not to exceed $14 million. The overloaded tail is being inspected for damage, and depending on how much is salvageable, the final cost of the replacement could be less. P–1 returned to test schedule March 21, 1994; currently conducting 100 percent ground loads testing.

Since this test point was well outside the normal operational envelope the airlift fleet experiences in actual service, no impact on operations is expected.

Question. How will the $116.5 million contained in your budget for "settlement" be used? How much of that would not be needed if the test program is extended as the Air Force currently plans, rather than the worst case scenario assumed in the settlement?

Answer. The $116 million in FY95 RDT&E funds designated for the settlement is aligned to the flight test extension (approximately $61.5 million), claims (approximately $43 million), and settlement-directed closure of a number of other issues that have been a problem on the development contract ($12 million).

The $61.5 million was the Government's share of a Defense Science Board-estimated $123 million to extend the test program from 80 aircraft months to 152 aircraft months. The current baseline test program includes 138 aircraft months, but in accordance with the settlement, the Air Force and McDonnell Douglas will negotiate a series of optional aircraft months that would only be exercised and paid for if needed. The Air Force is still evaluating the contractor's proposal for the test extension, but based on that proposal, approximately $7 million of the total Government share would be allocated to the additional 14 aircraft months not in the current baseline test schedule (to extend the program from 138 a/c months to 152 a/c months).

SMART WEAPONS

Question. The Air Force and the Navy are developing a number of smart munitions for its strike aircraft. (These include: TSSAM, JSOW, JDAM, and upgrades to tactical munitions dispensers.) Mrs. Druyun, please explain the Air Force's strategy for development of smart munitions for both fighters and bombers.

Answer. The Air Force is developing smart munitions to solve shortfalls in current weapon systems capability, and modernizing other existing weapons to significantly improve capability. These munitions include the Tri-Service Standoff Attack Missile (TSSAM), Joint Standoff Weapon (JSOW), Joint Direct Attack Munition (JDAM), Sensor Fruzed Weapon (SFW), and Wind Corrected Munitions Dispenser (WCMD) Kit. Specifically, the Air Force is planning to:

Add conventional guided weapons to bombers for large payload, time critical attacks, especially at the outset of a conflict (JDAM, JSOW, TSSAM, WCMD).

Add improved munitions accuracy in adverse weather conditions (JDAM, JSOW, TSSAM, WCMD). Current precision guided munitions (laser-guided and data link-guided bombs) have limited capability in adverse weather conditions. Current unguided bombs are inaccurate from medium and high altitudes, due to targeting errors and wind effects.

Add standoff attack capability outside point defenses (greater than 15 NM, i.e., JSOW) and outside area defenses (greater than 100 NM, i.e., TSSAM) to bombers and fighters to improve aircraft survivability. Current standoff capability is limited to Conventional Air-Launched Cruise Missile and Have Nap missile only on the B–52, and GBU–15/AGM–130 only on the F–15E and F–111F.

Add multiple kill per pass capability to fighters and bombers to improve target destruction and increase aircraft survivability (JDAM, JSOW, TSSAM, SFW, WCMD). Current capability limited to unguided cluster bombs (CBU–87 Combined Effects Munition and older CBU–52/58/71) and unguided general purpose bombs

(MK 82, MK 84). Multiple weapons and sorties are needed to achieve required target destruction with current munitions.

Add medium to high altitude capability to existing munitions (JDAM, WCMD).

Smart munitions allow fighter and bomber aircraft to attack targets with fewer weapons and without massed or repeat strikes. The result is lower aircraft losses and higher aircraft mission effectiveness.

Question. Let's focus on bombers. Explain which munitions go on which aircraft, what benefits are derived, and the missions that each bomber would perform with these munitions.

Answer. The attached table lists which munitions go on which aircraft.

There are six functional areas for munitions: general purpose, precision, standoff, Cluster Bomb Units (CBUs), naval mines, and nuclear.

General purpose munitions allow mass destruction of large area targets like manufacturing facilities or troop concentrations. Low Drag General Purpose (LDGP) bombs are usually delivered from high altitude. Other versions, such as Snake Eye (SE), Air Bag (AIR), and Retarded (R), are designed for low altitude delivery. The benefits of general purpose munitions are effectiveness against a variety of targets, low cost, and availability.

Precision munitions bring focused destruction to the enemy by being more accurate than general purpose munitions. This improved accuracy reduces collateral damage, and allows more targets to be destroyed in less time with fewer aircraft.

Standoff munitions are launched from outside the enemy's defenses, allowing accurate attacks on the enemy from a distance. This capability allows the use of non-stealth aircraft early in the battle without massive air defense suppression. Adding precision to standoff munitions gives the dual benefit of limiting the aircraft's exposure time to enemy defenses while reducing the number of weapons required to assure destruction of a target.

CBU munitions are designed to attack multiple targets, such as a column of armor, aircraft parked in the open, and personnel. They can also be used to deliver mines which inhibit enemy access to areas of our choosing. CBUs provide the ability to kill multiple targets spread over a large area with fewer munitions. This puts fewer aircraft and crews at risk.

Naval mines are used to control the seas. These munitions allow control of harbors and submarine activity by denying the enemy access to specific maritime areas.

The value of nuclear weapons is the ability to devastate a large area with a single weapon. This has the benefit of deterring an enemy from using similar weapons on the United States and its allies. These munitions support the Single Integrated Operational Plan (SIOP), providing deterrence from chemical, biological, and nuclear attack.

The B–2 will have both a nuclear and conventional capability with gravity weapons. Conventional munition integration on the B–2 includes Mk–84, CBUs, Mk–82, M117, and Mk–62 (naval mine). The B–2 will receive improved conventional strike capability with the GPS-Aided Targeting System (GATS) and Joint Direct Attack

Munition (JDAM). It will also have standoff precision capability with the Tri-Service Standoff Attack Munition (TSSAM). The primary role of the B–2 will be to provide strike capability against the most heavily defended targets. The B–2 will shoot standoff munitions (TSSAM) to take down enemy defenses. This will also help support penetrating B–1s in the early days of the battle.

The B–1's mission is to provide the primary conventional bomber mass attack. The B–1 will retain its current capability with Mk–82 and will receive additional capability through the Conventional Mission Upgrade Program (CMUP). The B–1 will have anti-armor, anti-materiel capability with CBUs, highly accurate bombing capability with JDAM, and standoff precision attack capability with Joint Stand-off Weapon (JSOW) and TSSAM. ECM upgrades tailored to the conventional role will enable the B–1 to employ direct attack weapons against all but the most heavily defended targets. With CMUP enhancements, the B–1 will be able to operate throughout the spectrum of conventional conflict, operating alone or as part of strike packages to attack all but the most heavily defended targets.

The B–52H will have the dual role of nuclear and conventional operations. It will be capable of delivering nuclear gravity and standoff weapons, including Air Launched Cruise Missile (ALCM) and Advanced Cruise Missile (ACM). For the conventional role, the B–52H will be able to deliver Conventional ALCM (CALCM), HAVE NAP, Harpoon and TSSAM standoff weapons, allowing the B–52H to effectively attack targets while remaining outside area defenses. JDAM will be integrated onto the B–52H for accurate attack of targets in lower threat regions. In addition, the B–52H will continue to provide a large portion of U.S. aerial mine laying capability.

This planned bomber force structure takes advantage of the unique characteristics of each aircraft to provide the most capable heavy bomber force possible within budget constraints and represents the most cost-effective approach to attack all critical targets.

BOMBER WEAPONS LOADING

WEAPON	GUIDANCE SYSTEM	WEIGHT	WARHEAD WEIGHT/TYPE	B-52H INT/EXT#	B-1 INT#	B-2 INT#
GENERAL PURPOSE						
MK-82 LDGP	N/A	500	500	*27/18	84	80
MK-82 SE	N/A	500	500	*27/18		
MK-82 AIR	N/A	500	500	*27/18	*84	80
MK-84 LDGP	N/A	2000	2000	*8/10		*16
M-117 LDGP	N/A	750	750	*27/18		36
M-117 R	N/A	750	750	*27/18		36
PRECISION MUNITIONS						
GBU-10 (PAVEWAY I)	**LASER	2000	2000	*0/8		
GBU-10 (PAVEWAY II)	**LASER	2000	2000	*0/10		
GBU-12 (PAVEWAY III)	**LASER	500	500	*0/10		
JDAM 1	INS/GPS	2000	2000	0/12	24	16
JDAM (PIP)	INS/GPS/TBD	2000	2000	0/12	24	16
STANDOFF MUNITIONS						
TSSAM	INS/GPS/IIR	2000	UNITARY/SUB	0/12	12	8
JSOW	INS/GPS	1000	BLU-108		12	
AGM-86/C CALCM	INS/GPS	3000	1000	*8/12		
AGM-84 HARPOON	INS/RADAR	1000	500	*0/8		
AGM-142 HAVE NAP	TV/IIR	3000	750/I-800	*0/3-4		
CBU						
CBU-52	N/A	750	BLU-61	*27/18		
CBU 58	N/A	750	BLU-63	*27/18		
CBU-71	N/A	750	BLU-86	*27/18		
CBU-87 CEM	N/A	1000	BLU-97	*6/18	30	36
CBU-89 GATOR	N/A	750	BLU-91&92	*6/18	30	36
CBU-97 SFW	N/A	750	BLU-108		30	36
MK-20 ROCKEYE	N/A	500	MK-118	*0/18		
NAVAL MINES						
MK-36 DST	N/A	500	500	*27/18	84	
MK-40 DST	N/A	1000	1000	*0/18		
MK-52	N/A	1000	625	*12/18		
MK-55/56	N/A	2000/2000	1290/360	*8/12		
MK-60 CAPTOR	N/A	2000	MK-46	*8/10		
MK-62	N/A	500	500	*27/18	84	80
MK-63	N/A	1000	1000	*0/18		
MK-64/65	N/A	2000/2000	2000/2000	*8/10		
NUCLEAR						
B-83	N/A	N/A	N/A	*8/0	*24	16
B-61	N/A	N/A	N/A	*8/0	*24	16
B-53	N/A	N/A	N/A	*2/0		
ALCM	N/A	N/A	N/A	*8/12	8	
ACM	N/A	N/A	N/A	*0/12	4	
SRAM	N/A	N/A	N/A	*8/0	*24	

*Currently Certified **Requires second aircraft to guide weapon #Internal/External Carriage

Current as of 11 Apr 94

Question. Why does the Air Force plan to put TSSAM on both the B–1 and B–2 bombers? Explain why the penetrating bomber (B–2) and the standoff bomber (B–1) both need standoff weapons.

Answer. The B–2 needs the TSSAM for two reasons, precision and standoff. The B–2 will use TSSAM in the precision role as it would any other precision munition. The B–2 will use TSSAM's standoff capability to bring down enemy defenses during the first days of a conflict. This will allow other assets, like B–1, to penetrate highly defended areas.

The B–1's mission is to provide the primary conventional bomber mass attack. The B–1 will employ TSSAM to bring down enemy defenses. The B–1 will then penetrate to the target to employ its other weapons.

Question. Please place in the record a table which shows: the funding by appropriation, fiscal year, and R–1/P–1 line for each munitions development program in the fiscal year 1995 budget. Indicate the amount requested in 1995, the total FYDP funding in fiscal years 1996 to 1999, the "to complete" figures, and the inventory objectives for each. Also include platform integration costs.

Answer. The table (with $M, in then years) follows:

Munition	Fiscal years		To complete	Procurement objective
	1995	Total 1996–99		
TSSAM:				
RDT&E (R–1: 143)	81.1	160.3	0.0	
Wpn Proc, AF (P–1: 4)	376.9	1,804.0	3,971.2	
Quantity	48	724	3,228	4,000
Aircraft Integration	18.2	50.0	307.4	
JSOW:				
RDT&E (R–1: 96)	49.0	74.4	20.6	
Wpn Proc, AF (P–1: N/A)	0.0	88.8	1,688.8	
Quantity	0	175	4,825	5,000
Aircraft Integration	8.0	94.5	TBD	
JDAM:				
RDT&E (R–1: 89)	85.0	328.4	46.0	
Wpn Proc, AF (P–1: N/A)	0.0	131.7	3,713.2	
Quantity	0	665	61,335	62,000
Aircraft Integration	129.1	342.6	TBD	
WCMD Kit:				
RDT&E (R–1: 86)	21.5	82.6	TBD	
Wpn Proc, AF (P–1: N/A)	0.0	42.8	TBD	
Quantity	0	TBD	TBD	TBD
Aircraft Integration	0.0	TBD	TBD	
SFW:				
RDT&E (R–1: 86)	1.6	5.9	3.6	
Wpn Proc, AF (P–1: N/A)	113.5	1,025.9	164.1	
Quantity	260	3,834	674	5,000
Aircraft Integration	0.0	0.0	0.0	(1)
AGM–130:				
RDT&E (R–1: 87)	101.6	0.0	0.0	
Wpn Proc, AF (P–1: 7)	91.3	218.3	0.0	
Quantity	102	0	0	502
Aircraft Integration	0.0	0.0	0.0	(1)

[1] Integration complete.

Note: The aircraft integration funding shown is only that budgeted/approved. Total requirements over the FYDP are being determined and refined.

Question. On which aircraft will these munitions be used, and what benefits are expected to be achieved?

Answer. The munition, aircraft, and benefits are summarized in the table below:

Munition	Aircraft	Benefits
TSSM	B–1, B–2, B–52H, F–16C/D, F/A–18.	Standoff outside area defenses, Precision delivery, Multiple kills per pass, Low observable signature and low altitude operation for survivability, Used against critical heavily defended/time sensitive/high value targets.
JSOW	F–16, F–15E, B–1, F/A–18, AV–8B.	Standoff outside area defenses, Accurate delivery, Multiple kills per pass, Low observable signature for survivability.
JDAM	B–1, B–2, F–16, F–22, F–15E, F–117, B–52H, F/A–18, F–14D, AV–8B.	Accurate delivery, Adverse weather capability, Multiple kills per pass, Upgrades existing 2,000 and 1,000 lb bombs with GPS/INS guidance kit, United against fixed and point targets.
WCMD Kit.	B–1, B–2, B–52H, F–15E, F–16, F–117.	Accurate delivery, Adverse weather capability, Improves medium to high altitude effectiveness of existing inventory dispenser munitions with INS guidance kit, Used on anti-armor, anti-material/personnel and area denial weapons.

Once integration of these weapons is complete, all fighter and bomber aircraft will have a precision and/or accurate munitions capability. This will allow our smaller force to be highly survivable and effective.

Question. The recent DOT&E annual report to Congress indicates that the Sensor Fuzed Weapon (SFW) is most effective when released at low altitude, yet during Operation Desert Storm the Air Force favored medium to high altitude weapons due to the small arms fire and shoulder fired anti-aircraft missile threats. What are the implications for design of the weapon? What are the implications for its use on the B–2? What are the implications for its use on tactical fighter aircraft?

Answer. The current SFW concept of operations is to use low altitude tactics to deliver the weapon from fighter and bomber aircraft. The primary tactic for SFW is low level, high speed approach and either a level or slight dive delivery. Low altitude delivery tactics are much less affected by wind.

To provide the same level of effectiveness for SFW when delivered from medium to high altitude, the Air Force intends to develop the Wind Corrected Munitions Dispenser (WCMD) Kit. The WCMD Kit will provide corrections for the effects of winds when SFW, Combined Effects Munition (CEM), and Gator mines are delivered from medium to high altitude.

Question. The AMRAAM missile is undergoing a ——— fire program for the purposes of initial operational testing, even though 2 missiles have already been fired successfully in combat. However, the recent annual DOT&E report to Congress states that through December 1993, ——— missiles had been fired, but ——— of them failed to achieve their primary mission objective. Does AMRAAM have a problem? What have been the results of more recent tests?

Answer. A third combat kill was achieved on 28 Feb 94 over Bosnia further supporting our position that AMRAAM does not have a problem of the magnitude indicated by the test data. In addition, four more AMRAAM test shots have occurred since the report to Congress and preliminary results for these tests are satisfactory. The information that follows is preliminary. FOT&E testing is being conducted by the Air Force Air Warfare Center at Eglin Air Force Base, FL, which makes the final determination of test results. Of the ——— tests to date there have been ——— test anomalies. In ——— cases software fixes to the missile had been identified prior to testing but had not been incorporated into the AIM–120A missile. Unlike the AIM–120B missiles, now in production, the AIM–120A missiles are not software reprogrammable. In one case the aircraft radar broke lock when it ceased to track the target and the missile aborted launch as it should have. ——— received bad data link messages from the aircraft and a software fix to the aircraft has been identified. In yet another case, the missile ———. The corrective action to this problem is being examined and will be prioritized with other software changes. The remaining anomaly involved a malfunction of the control fins. This is the first malfunction of this type in over 300 launches and a unique assembly process was identified as the cause.

In summary, software fixes to ——— anomalies have been identified, one missile correctly aborted a launch ——— may be solved with an aircraft software change and a recurrence of the last problem has been eliminated by modifying the assembly process.

MX WARHEADS

Question. The Air Force plans to retire the MX missile at the end of the decade due to strategic arms treaties. Under current plans, the only remaining land based ICBM will be the Minuteman III with a single nuclear warhead. General Hawley, please explain the difference in capability between the MK–12, MK–12A, and MK–21 warheads.

Answer. Warhead capability can be defined in terms of yield and physical, operational and safety attributes. The following list of warhead differences is not all inclusive. However, those listed are of greatest significance when comparing these three warheads.

The warhead in the MK–12 (W62) has a yield ———. The warhead in the MK–12A (W78) has a yield ———. The MK–21's warhead (W87) has a yield ———.

The MK–21 has an advanced physical design which improves the flight dynamics over the MK–12 or MK–12A. the result is better accuracy.

The MK–21 has a more sophisticated arming and fuzing system. This provides more options for weapons employment, hence greater operational flexibility. While not as sophisticated as the MK–21 arming and fuzing system, the MK–12A system is more capable than the MK–12.

The MK–21 is also more sophisticated from a maintenance perspective. The time between mandatory maintenance actions to ——— for either the MK–12 or the MK–12A. This translates into fewer maintenance man-hours required to operate the system and thus dollars saved.

The Drell Commission defined three desirable modern safety features that all future nuclear warheads should have. The Hatfield Amendment to the 1993 Energy and Water Development Appropriations Bill directed these same features be considered for upgrade into existing warheads. These three features are: insensitive high explosive (IHE), fire resistant pits (FRP), and an enhanced nuclear detonation safety (ENDS) system. The MK–21 warhead (W87) has all three features—IHE, FRP, and ENDS. The MK–12A warhead (W78) has ENDS, but neither IHE nor FRP. The MK–12 warhead (W62) has none of these features.

Question. What advantages does MK–21 have over the MK–12 in terms of nuclear safety? Discuss Drell Commission findings.

Answer. The Drell Commission defined three desirable modern safety features that all future nuclear warheads and bombs should have. The Hatfield Amendment to the 1993 Energy and Water Development Appropriations Bill directed these same features be considered for integration into existing weapons.

These three features are an enhanced nuclear detonation safety (ENDS) system, insensitive high explosive (IHE), and fire resistant pits (FRP).

The ENDS system prevents premature arming of nuclear weapons subjected to abnormal environments. The basic idea is to locate the electrical elements critical to detonation in an exclusion region that isolates the components from all sources of unintended energy. The only access into the exclusion region is through break points called strong links.

Nuclear weapons contain radioactive material in close proximity to high explosives (HE). Detonation of the HE, while not producing a nuclear yield, could scatter radioactive material. Using IHE reduces the probability of such a detonation in the event of an accident, sabotage or terrorist attack.

Fire resistant pits place a shell around the radioactive material (pit). If the warhead is subjected to the high temperatures of a fire (e.g., from an accident), the pit may melt. The shell would contain the molten radioactive material reducing the likelihood of plutonium dispersal.

The MK–21 warhead (W87) has IHE, FRP, and ENDS.

the MK–12A warhead (W78) has ENDS, but neither IHE nor FRP.

The MK–12 warhead (W62) has none of these.

Question. How much has been spent to develop and produce MK–21 warheads to date?

Answer. The cost to develop and produce the MK–21, including DoD and DOE costs, was ———.

Question. Does the Air Force plan to pursue a MK–12A hard target upgrade to the Minuteman III?

Answer. No. The Air Force does not currently plan to upgrade the operational capability of the MK–12A warhead.

Question. Does the Air Force have a funded plan to retrofit MK–21 warheads on the Minuteman III missile?

Answer. No. The Safety-Enhanced Warhead for Minuteman III is a pre-Milestone 0 effort and the Operational Requirements Document (ORD) is still being written. Several options will be analyzed, as part of Phase 0, to determine the most cost-effective means of meeting the requirement. Program funding will be added in conjunction with the requirements and acquisition processes.

Question. If there were not sufficient funds to perform such a retrofit [onto the Minuteman III missile], would MX warheads simply be scrapped?

Answer. ———.

Question. How much would a Minuteman III/MK–21 warhead retrofit program cost and how difficult would this be technically?

Answer. The use of the MK–21 on Minuteman III is not estimated to be technically difficult at this time. Significant tasks would include: Software changes and additional memory space in the missile guidance computer. Targeting software changes in the Launch Control Center computers. Mechanical mating adaptation for the reentry vehicle bulkhead. Modifications to cables and connectors. Adaptation of the Reentry System Test Set to test the MK–21 in a single warhead configuration.

The Safety-Enhanced Warhead for Minuteman III is a pre-Milestone 0 effort and the Operational Requirements Document (ORD) is still being written. Several options will be analyzed, as part of Phase 0, to determine the most cost effective means of meeting the requirement. More definitive data will be provided when this analysis is complete.

Question. How much would be required in fiscal year 1995 to initiate such a program?

Answer. $10–15 million would be required in fiscal year 1995 to initiate such a program. Costs identified in this response only modify Minuteman III to allow it to accommodate the MK–21 warhead. The Safety-Enhanced Warhead for Minuteman III is a pre-Milestone 0 effort and the Operational Requirements Document (ORD) is still being written. Several options will be analyzed, as part of Phase 0, to determine the most cost-effective means of meeting the requirement. More definitive data will be provided when this analysis is complete.

Question. Does MK–21 or Minuteman III provide any military useful advantage compared to MK–12?

Answer. Yes.

The MK–21 has two characteristics that increase the achievable application efficiency and damage expectancy. ——— the MK–21 has ——— the yield of the MK–12 ———. The MK–21 also has an improved aerodynamic design which contributes to better accuracy.

The MK–21 has a more sophisticated arming and fuzing system. This provides more burst options for weapons employment, hence greater flexibility than for either the MK–12 or MK–12A.

The MK–21 also has a longer Limited Life Component (LLC) cycle, which reduces off-alert time, the number of intra-wing reentry vehicle convoys, and maintenance man-hours.

JOINT STARS

Question. The budget requests $190 million for continued development and test of the JSTARS aircraft, which is used to track moving enemy ground targets like tanks. Mrs. Druyun, what is the status of the JSTARS development program?

Answer. The May 93 AFSARC/DAB process resulted in a positive decision for Low Rate Initial Production based on successful completion of user-defined critical test requirements and system level performance criteria. The program is on track to the approved Acquisition Program Baseline. The third Full Scale Development aircraft (E–8C, production-representative) will enter the test program later this year to support Multi-Service Operational Test and Evaluation in Apr 95 and a planned Milestone III production decision in Jan 96.

Question. Explain the self-defense capabilities originally planned for the aircraft and what is now envisioned. Why is this an acceptable risk?

Answer. The original self-defense suite included Tactical Digital Information Link—Alpha (TADIL–A), Constant Source, Tactical Information Broadcast System (TIBS), AAR–44 Missile Warning Sensor, and ALE–47 Countermeasures Dispenser System. Currently planned capabilities include Tactical Digital Information Link—Joint (TADIL–J), Constant Source, and Group-A provisions for the full original suite as required. The Air Force is taking the lead to define and plan an infrared countermeasures development, production and retrofit program applicable to large and special aircraft, including Joint STARS. Multi-Stage Improvement Program (MSIP) improvements will be carefully evaluated using the ongoing Cost and Operational Effectiveness Analysis process to be both cost-effective and necessary. The Air Force and Office of the Secretary of Defense thoroughly reviewed the vulnerability and risks of Joint STARS during the May 93 AFSARC/DAB process and concur with the program approach.

Question. What is the contractor's performance on JSTARS development contract?

Answer. The basic Full Scale Development contract is a Fixed Price Incentive Fee and is 90% complete. Only residual tasks, such as Functional and Physical Configuration Audits, remain incomplete. We are targeting completion for Jun 94. The Grumman overrun effort was approximately $160 million, and this is at their expense. The Follow-On Full Scale Development contract is a Cost Plus Incentive Fee that is 76% complete. It is at target on cost and there is a two month slip in schedule for software and systems engineering. We predicted an overrun and incorporated this cost/schedule risk into the DAB program and APB milestones. Sufficient budget and schedule exist to cover the estimates at completion and to prevent any milestone breaches.

Question. The JSTARS Selected Acquisition Report submitted to Congress last week includes the statement: "Due to funding constraints, the Self Defense Suite now consists primarily of phased situation awareness functionality." Does this mean that JSTARS has no self defense from enemy attack? Not even chaff and flares?

Answer. Joint Stars will utilize three elements of self defense: 1, standoff surveillance of the battlefield, using a multi-mode radar; 2, friendly fighters flying combat air patrol; and, when necessary, 3, execute escape tactics to avoid the threat. These elements require situational awareness via JTIDS Tactical Digital Information Link—Joint (TADIL–J) and Constant Source, currently programmed for integration with the baseline production program (beginning with Production Aircraft Number 9). In addition, the program has a long-term plan to evaluate other self-defense options through the Multi-Stage Improvement Plan (MSIP) with the goal to balance threats against affordability. The current Joint STARS production program includes Group A installation that will permit growth capability to carry chaff and/or flares as required, and as technology/funding permit.

Question. How much has been invested to date in the JSTARS self defense system?

Answer. $59.3 million total has been obligated to date.

CHEYENNE MOUNTAIN UPGRADE

Question. The Committee has had a long standing interest in the health of the computer upgrades at Cheyenne Mountain, whose mission is to warn of a nuclear attack on the United States. The fiscal year 1995 budget requests $100 million for R&D and procurement of Cheyenne Mountain upgrades. Mrs. Druyun, the Air Force has been trying for 20 years to upgrade the computers within the Cheyenne Mountain complex. Up through last year many Air Force witnesses testified that the program was finally "on track". What is the status of the Cheyenne Mountain upgrades?

Answer. The Cheyenne Mountain Upgrade (CMU) continues to make significant progress, including the completion of two recent major milestones. On 28 Jan 94, the Commander of Air Force Space Command (AFSPC) declared that the Space Defense Operations Center (SPADOC 4C version 1) had reached Initial Operational Capacity (IOC). This provides AFSPC with consolidated Space Defense/Space Surveillance capability. The Commander of AFSPC also declared that the Communications System Segment Replacement (CSSR) Black Technical Control had reached IOC on 9 Feb 94. In addition, other significant, positive events have occurred. The hardware for CSSR and Commander Center Processing and Display System Replacement (CCPDS–R) has been installed in the Alternate Processing and Correlation Center (APCC) at Offutt AFB, NE. The testing of the wide band link between APCC and Cheyenne Mountain has begun. Survivable Communication Integration System (SCIS) has been progressing well; hardware is being installed in Cheyenne Mountain Complex (CMC), and government software testing has begun in Colorado Springs. CCPDS–R is nearing completion of its missile warning test phase and follow-on Processing and Display System (PDS) installations are continuing on schedule. There are program impacts that have arisen during the test phase. They are discussed in detail below.

Question. The Director of Operational Test and Evaluation (DOT&E) annual report to Congress states that based on a number of problems encountered during 1993 tests of Cheyenne Mountain subsystems the overall Cheyenne Mountain Upgrade program is assessed to be "marginal" in both operational effectiveness and suitability. What problems have been discovered during initial testing?

Answer. The types of problems identified were related primarily to SPADOC and CSSR Black Technical Control. SPADOC required calculation of orbits for over 7,000 objects in space and had difficulty maintaining accurate calculations on 16 of those objects that were in highly elliptical orbits. Operational procedures were established until a fix was implemented. CSSR deficiencies were identified prior to IOT&E and prioritized for resolution. Critical deficiencies have been corrected. High priority items have been tested and are awaiting installation. Minor items are awaiting demonstration in the off-site test facility this spring (Apr 94). The bottom line is that the user continues to be satisfied with performance of subsystems delivered to date.

Question. The Committee understands that a "schedule breach" is imminent on one of the larger computer upgrades called "CCPDS–R". Is this true, and what are the implications?

Answer. Yes, on 24 Jan 94, the CMU System Program Office submitted a Program Deviation Report indicating the Acquisition Program Baseline milestone for CCPDS–R/Missile Warning will not be met. We expect CCPDS–R IOC date to slip from Mar to Jun 94. We are currently assessing the effect, if any, the CCPDS–R slip will have on the remainder of the CMU schedule.

Question. Does this program still command the attention from the top Air Force acquisition decision-makers, such as yourself?

Answer. CMU continues to receive oversight from the Air Force as well as OSD. We recently held a Defense Acquisition Executive Summary (DAES) review with OSD to review program status and performance. We will continue to provide attention to this program given its tight testing schedule and since it is at its most critical phase of testing (integrated string testing) and deployment.

Question. Will the Air Force deliver this system within the $1.6 billion cost cap that was promised to the Congress?

Answer. Currently, the program is within its $1.6B baseline cost. The results of the assessment of the CCPDS–R/Missile Warning IOC slip and the impact, if any, on the baseline cost should be known in a few months.

Question. Will the Air Force deliver the integrated system and all its major components on time?

Answer. The CMU Full Operational Capability (FOC) is currently scheduled for Dec 95. We are currently assessing the CMU-wide impacts of the CCPDS–R/Missile Warning IOC slip. Based on CCPDS–R lessons learned, we are also assessing the need to extend the testing of other subsystems, and what impact this additional testing may have on CMU FOC.

NATIONAL AEROSPACE PLANE (NASP)

Question. Congress ended the National Aerospace Plane (NASP) flight demonstration project last year. The Air Force is requesting $45 million for "Hypersonic Flight Technology" to continue exploration of certain NASP components. What applications are envisioned for this technology for the Air Force?

Answer. Hypersonic technology development could be significant in providing rapid global power projection and sustainment of air and space technological superiority into the 21st century. Hypersonic technology, which yields an optimum combination of speed, range, precision, lethality, and flexibility, can ensure future warfighting capabilities. Hypersonic systems can impact many important areas including "real time" knowledge of the enemy, projecting power globally, space control, and providing protection against future ballistic and cruise missiles and Weapons of Mass Destruction (WMD).

Question. What applications are possible for NASA or the commercial sector?

Answer. Hypersonics have the potential to revolutionize NASA's and the commercial sector's ability to affordably access space and to open up a whole new market in very high speed commercial transportation. Hypersonics can provide flexibility, responsiveness, efficiency, safety, and economy for airbreathing aerospace planes.

Question. How much in total does the Air Force plan to invest in this research in the foreseeable future?

Answer. The total Air Force funding to complete the jointly planned Hypersonic Systems Technology Program (HySTP) is $325 million over the next six years. This level of funding is not currently in the hypersonic technology program, but it is our intention to make the correction during the upcoming budget exercise.

Question. For the record, provide the separate estimated Air Force and NASA funding by fiscal year and in total.

Answer. The estimated Air Force and NASA funding required to jointly conduct the Hypersonics Systems Technology Program (HySTP) by fiscal year is provided below. The Air Force's portion of this level of funding is not currently in the hypersonic technology program, but it is our intention to make the correction during the upcoming budget exercise.

	FY95	FY96	FY97	FY98	FY99	FY00	Total
Air Force	45.0	60.0	60.0	60.0	60.0	40.0	325.0
NASA	22.5	30.0	30.0	30.0	30.0	20.0	162.5
Total	67.5	90.0	90.0	90.0	90.0	60.0	487.5

MANUFACTURING TECHNOLOGY

Question. The statement indicates that the Air Force Manufacturing Technology program contributes to the maintenance of the U.S. industrial base, yet the Air Force has budgeted no funds for this purpose in fiscal year 1995. Mrs. Druyun, it has been the opinion of the Committee for a number of years that the DOD manufacturing program is "broken". Would you agree?

Answer. The current Manufacturing Technology (MANTECH) program is in disarray and will not maximize return on investments. The lack of funding stability in the program has made long-range planning extremely difficult, resulting in an unfocused program.

In the Fiscal Year 1994 President's Budget, OSD consolidated all Service MANTECH funds in a single OSD program under DDR&E. As a result, the Services requested zero funding for MANTECH. However, the House Armed Services Committee, Senate Armed Services Committee, House Appropriations Committee, Senate Appropriations Committee, and the Appropriations Conference provided funding to the individual Services, while the Authorization Conference provided funding to OSD and directed DDR&E distribution of these funds. For the Fiscal Year 1995 President's Budget submission, MANTECH funding remains in the OSD account.

The current MANTECH program suffers from extensive "earmarking" which disrupts the carefully planned and well balanced competitive program that the Air Force has established. I would say that the combination of management problems, Congressional "earmarking", and a mismatch between authorizations and appropriations has resulted in a MANTECH program that lacks focus and a vision for the future.

Question. Is the Air Force Manufacturing Technology program important to the Air Force?

Answer. Yes, the Air Force Manufacturing Technology (MANTECH) program is important to the Air Force. The Air Force has historically supported a strong MANTECH program that was focused to provide manufacturing technology for both Service needs and the needs of the United States commercial industrial base. The Air Force's long established focus on technologies which enhance reliability, maintainability, sustainability, and now increasingly affordability, includes finding ways to reduce manufacturing costs early in the technology development process. Through the Air Force MANTECH program, advanced manufacturing and production methods will be integrated into the product technology development process at the earliest stages. This early consideration of producibility issues will serve to maximize the positive impact MANTECH can have on reducing the high manufacturing costs associated with emerging technologies and the systems to which they lead. The Air Force MANTECH program is predominately contracted to industry, which ensures that manufacturing technology transitions into military and commercial applications.

Given stable, predictable funding, the Air Force believes that the MANTECH program could continue to be an extremely valuable program, as it has been in the past. MANTECH can help us meet the future acquisition needs of the warfighters by considering manufacturing issues in the earliest stages of the technology development process. However, it is difficult to manage such a program and produce useful products without program stability. The Air Force is eager to work with OSD and Congress regarding management of the MANTECH program.

Question. Armed Services Committees have failed to authorize what has been appropriated for DOD manufacturing programs for the past few years. What has been the impact during the last 6 months?

Answer. The differences (language and funding) between authorizing and appropriating committees for Fiscal Year 1994 has been partially responsible for the issuance of stop work orders on 23 out of a total 39 ongoing (initiated prior to Fiscal Year 1994) Air Force contracts for manufacturing technology. This caused the loss of over 300 industrial jobs. An additional impact was the late and partial release of funding for Congressionally "earmarked" manufacturing projects which delayed initiation of the Fiscal Year 1994 Air Force Manufacturing Technology Program.

Question. Provide for the record the Fiscal Year 1994 and 1995 requirements for Air Force MANTECH funding as they were planned a year ago compared to the current estimated funding, by project.

Answer. The Air Force has determined through recent experience that the appropriate level of funding needed to support a Manufacturing Technology (MANTECH) program that will serve the future capability needs of the warfighters is approximately $75M per year. Thus the Air Force program plan one year ago was approximately $75M for each year. The Air Force required manufacturing technology funding level of approximately $75M would be allocated to the following projects or technical areas: Aircraft ($16M), Missiles and Munitions ($8M), Spacecraft and Launch Systems ($6M), Command, Control, Communications and Intelligence (C3I) Mission Electronics ($3M), Industrial Base Pilot Programs ($22M), Aerospace Sustainment ($7M), Manufacturing Systems ($9M), and Advanced Manufacturing ($4M). The current estimated funding for Fiscal Year 1994 is $44.5M. We expect to receive at least 33% ($32M) in Fiscal Year 1995 of the $97M requested by OSD. The available funding in Fiscal Year 1994 and Fiscal Year 1995 will be divided between the above referenced projects or technical areas.

Question. Provide for the record the funding by project which the Air Force expects to receive from the OSD account in 1995.

Answer. While the Air Force is unsure of the exact funding level it will receive from the OSD account for Fiscal Year 1995, we expect the amount to be at least 33% ($32M) of the $97M requested by OSD. Although there are no formal projects in the Manufacturing Technology (MANTECH) Program, the Air Force would focus the available funds an Aircraft, Missiles and Munitions, Spacecraft and Launch Systems, Command, Control, Communications and Intelligence (C3I) Mission Electronics, Industrial Base Pilot Programs, Aerospace Sustainment, Manufacturing Systems, and Advanced Manufacturing projects or technical areas. The available funding in Fiscal Year 1994 and Fiscal Year 1995 will be divided between the above referenced projects or technical areas.

Question. Provide for the record a brief description of the "VTest" program, its priority within Air Force MANTECH programs, and which other Air Force programs plan on using the technology which VTest would provide.

Answer. The purpose of the VTest program was to provide computer tools that allow designers to describe and simulate electronic test functions. For example, the VTest program would have provided the capability to unambiguously utilize testing descriptions at any prime or subcontractor facility. The VTest program was a competitively selected effort that would have contributed to both the United States military and the commercial sector. However, the funding available for Congressionally-directed and ongoing contractual programs was not sufficient to continue the VTest program in Fiscal Year 1994. The overall budget impact placed 23 out of a total 39 ongoing contracts in stop work status, resulting in the loss of over 300 industrial jobs. Given sufficient Fiscal Year 1995 Manufacturing Technology funding, the VTest contracts now in stop work will be reevaluated for continuation in Fiscal Year 1995.

The VTest program was developed using F–22 components as a baseline. However, the electronic test simulation tools VTest was intended to provide would have been applicable to future Air Force systems, or current system upgrades.

AUTOMATIC TEST SYSTEMS

Question. The Committee and OSD have been concerned about past practices where individual weapon systems develop their own unique expensive test equipment, causing maintenance and airlift difficulties when the weapons are deployed. Last year the Committee required an OSD-approved cost-benefits analysis to be submitted to Congress prior to the acquisition of any system-unique automatic test systems. A June 30, 1993, DOD/IG report stated: "The

Air Force is procuring an F–15 Downsized Tester to replace existing automatic test equipment for the F–15 aircraft. The Air Force was planning to develop and procure unique automatic test equipment that is not cost-effective. As a result, the Air Force could spend $167 million for automatic test equipment with capabilities limited to testing portions of the F–15 avionics system." The DOD/IG recommended that the Air Force discontinue its acquisition of the F–15 down-sized tester. Did the Air Force comply?

Answer. The Air Force did not concur with the recommendation. The Air Force response to Auditors maintained that the requirements and previous cost studies are valid and, taken as an whole, satisfy DoD acquisition policy. This led to a Tri-Service Study (Sept 93) chaired by OSD that compared the F–15 DST to IFTE. IFTE did not meet the deployment requirement for 2-pallet portability. Cost and technical comparative analysis showed that the F–15 DST was clearly the best solution for the F–15 requirement.

Cost (millions)	DST	IFTE
Total LCC (includes O&S)	$578	$683
Acquisition cost	167	306

Based on the findings of the Tri-Service study, an agreement was reached between the Air Force and OSD that the Air Force would be allowed to procure the proposed F–15 DST for the F–15 requirement. The DOD/IG concurred and further audit action was canceled. As a result of this agreement, funds were released and the contract was awarded to Grumman (October 93).

Question. Does either OSD or the Air Force have a policy in place today to prevent its weapon system program managers from acquiring unique test equipment?

Answer. The Air Force issued a policy letter dated 30 July 1992 that directed the use of DoD inventoried ATS or commercial ATS and restricted the development of weapon system unique ATS. This policy letter also directed establishment of an ATS Product Group Manager (PGM) to implement this policy and manager all ATS procurement. The ATS selection process will consider all requirements in the context for satisfying total Air Force requirements. Primary source of ATS will be DoD ATS families. Second preferred source will be other DoD inventory ATS. Third preferred source is modification to existing ATS. If previous solutions do not cost effectively meet users needs, the fourth preferred source is commercial off the shelf. If none of the above can satisfy requirements, a waiver may be requested for new development. A cost benefit analysis must accompany a waiver request. This policy is contained in a new Air Force Policy Directive and Air Force Instruction that are awaiting final signature. The DoD policy for ATS is contained in DoDD 4151.18. Maintenance tooling, equipment, test measurement and diagnostic equipment including automatic test systems and their associated software programs, skills for similar type workloads shall be standardized among DoD Components. Air Force has coordinated on new OSD draft policy on ATS acquisition.

Question. What are Air Force plans to capitalize on the hundreds of millions of dollars invested so far into the Army (IFTE) and Navy (CASS) families of common test equipment?

Answer. It is Air Force policy that every ATS acquisition will examine CASS and IFTE. Since CASS/IFTE were not originally designed for USAF requirements, modifications may be required for applications to Air Force weapon systems. Evaluation of cost, schedule, and technical impacts of CASS/IFTE adaptation will be performed. A Tri-Service effort has been established to collect ATS requirements from across the Services. It is critical that these requirements be identified in sufficient time to allow CASS/IFTE to be modified to meet the Service's particular needs. A waiver process has been established for ATS acquisitions outside of the existing families. A cost/benefit analysis must be submitted with the waiver request.

Question. The Committee understands that the Air Force is now pursuing a unique system to support the F–117. Has a technical analysis been performed to verify that the F–117 electro-optical weapon system is so unique that its test requirements cannot be performed by an appropriate piece of DoD designated family of ATS, such as CASS or IFTE?

Answer. The Air Force is not now pursuing a unique system to support the F–117. The Consolidated Automatic Test Equipment (CATE) was unique when it was developed and acquired in the 1989–1993 timeframe. However, the current Air Force ATS policy restricting development of weapon systems unique ATS was not in place at the time that the CATE acquisition decisions were made. The Air Force is pursuing an additional capability for the existing CATEs, to automatically test electro-optical assemblies for the F–117. This will be an additional bay of equipment. This program does not require any modification to the existing CATE hardware. It will have no processing capability resident in the bay itself, it will be completely controlled by the CATE. A technical analysis of all the potential systems including CASS and IFTE has been performed. The uniqueness of the F–117 electro-optical was not the essential consideration. Physical constraints, mobility, rehosting software, interface devices, power and cooling were all considered as part of the evaluation.

Question. Explain how the Air Force is pursuing ATS for the F–22.

Answer. The F–22 approach for Automatic Test Systems (ATS) is to procure commercial off-the-self equipment as much as possible. ATS for the F–22 falls into two categories: factory ATS for use by the contractors in their manufacturing facilities and depot ATS for use in the facilities that will support the operational F–22 force. The F–22 baseline plan is to procure the same type of equipment for both depot and factory ATS. This approach supports vertical testability and studies have shown this to be the most cost effective approach. While the final decision on F–22 depot ATS is several years away, procurement of F–22 factory ATS by the contractor is already underway and the majority of this effort will be complete in FY94.

Current DoD policy is to standardize ATS wherever possible. The Air Force intends to support this goal in the procurement of F–22 depot ATS. The Air Force approach will be to (1) continue to investigate opportunities for common interfaces with DoD standard ATS systems, with an emphasis on moving to commonality when depot

ATS is definitized, (2) give the DoD standard ATS systems first consideration in the decision for depot ATS and (3) insure the selected ATS plan is supported by a thorough cost/benefit analysis. This approach allows the Air Force to capitalize on the money already invested in F–22 factory ATS, take advantage of the commercial market, maintain vertical testability and focus the program towards a cost effective standardized solution at the depot.

Question. Has a cost-benefit analysis relating to the development and procurement of this system-unique electro-optical automatic test equipment for the F–117 fighter been performed, and when will it be submitted to Congress?

Answer. The Air Force recently conducted an abbreviated CBA comparing the CASS, IFTE and CATE systems. The preliminary CBA was distributed for review within the Service on 25 March 1994. The final results will be provided to Congress by 15 May 94.

Question. Describe for the record the Air Force's acquisition strategy for the F–117 electro-optical ATE and the associated milestones.

Answer. The Air Force's acquisition strategy for the F–117 electro-optical was the competitive procurement of an engineering change proposal to add intermediate level maintenance capabilities for the F–117 Infra-red Acquisition Designation System. The winning bid was accomplished through a source selection. The procurement is on hold pending prime contract award.

Question. Why is CASS and/or IFTE equipment not suitable in this instance?

Answer. CASS exceeds the size and weight limitations for the CATE Double Wide Avionics Van; if CASS were used it would require a redesign of the van. CASS and IFTE cannot meet the F–117 CATE requirement without a major investment in off-loading TPSs, new hardware, documentation and spares. IFTE does not have a I-level Electro-Optic testing capability.

Question. Provide for the record the amount budgeted in each fiscal year 1993 to 1998 for the F–117 E–O ATE by appropriation, fiscal year, and R–1/P–1 line.

Answer.

Appropriation 3010

Fiscal year:	*Millions*
1993	$2.096
1994	21.783
1995–98 [1]	

[1] No funding.

AIM–9X SHORT RANGE MISSILE

Question. The Committee requested the Department to evaluate offshore, short range air-to-air missiles against the AIM–9X requirement to see if any offered superior technologies and an opportunity to avoid or otherwise reduce AIM–9X development costs. The Committee also provided FY 1994 funding to initiate the AIM–9X Dem—Val, pre-MSII, program. What is the status of the requested report on foreign alternatives? What conclusions have been reached, if any?

Answer. The OSD independent review of the AIM–9X program, directed by the SAC FY 1994 report, has been completed and delivered to the Committee Chairman. Several of the questions raised in the SAC language can not be answered at this time, as they are dependent on the contractor's responses to the Dem-Val RFP. All of the questions, however, should be addressed in detail as part of the normal DAB preparation and review process currently planned for late 1994.

The OSD report concluded that the overall AIM–9X program is on track. Technical soundness and risk will be assessed as part of the DAB and source selection process. While adequate funds are programmed to accomplish the Dem-Val phase, there is a shortfall for the Engineering and Manufacturing Development Phase. This funding shortfall will be resolved during the Services' FY96 POM development.

In November 93, an OSD led team visited the UK to conduct a review of the ASRAAM program. The team concluded that while the ASRAAM seeker is compatible with AIM–9K requirements, the missile lacks in maneuverability and in warhead size. Additionally, the highly concurrent schedule contains inadequate testing, making timely executive of the program risky.

The department's position is that ASRAAM, as it currently exists, will not meet several of the key performance parameters outlined in the AIM–9X Joint Operational Requirements Document. The likely cost and time needed to make the necessary improvements in ASRAAM would negate any savings realized from a joint ASRAAM program.

Question. Press articles have mentioned an AIM–9X RFP and RFI. Please explain what each is designed to achieve?

Answer. The RFP mentioned in recent press articles will solicit contractor bids for the AIM–9X seeker Dem-Val. This 18 month Dem-Val will award two competitive contracts designed to demonstrate the program's greatest technical challenge—an advanced focal plane array imaging seeker and its associated signal processor. The two selected concepts will be evaluated and subjected to rigorous hardware-in-the-loop, ground flyover and captive carry flight testing. Signal processing risk will be mitigated by providing the contractors with previously developed and tested signal processing algorithms. Preliminary AIM–9X all-up-round designs will be developed using the BOX OFFICE and BOA advanced airframe designs which are currently undergoing design and flight testing. The MSII Engineering and Manufacturing Development (EMD) decision process will be a full and open competition leading to the selection of one EMD contractor.

Given the importance of countering the existing threat and the non-availability of acceptable existing alternatives, OSD decided that it was prudent to maintain US options to field a short range missile while simultaneously exploring opportunities for foreign participation. Therefore, in conjunction with the release of the MSI seeker Dem-Val RFP, Request for Information (RFI) letters will be sent to several allies to further investigate the potential for their participation in a joint development program beginning with Engineering and Manufacturing Development. Modifications were made to the RFP to alert industry to the Government's intention of exploring foreign participation and cooperation in the EMD phase as well as the production phase.

Question. To the extent that the RFI seeks information from foreign governments, as is reported, please explain how this information will be used to develop programmatic options. Further describe how and when any foreign production or nearly-in-production missile options will be considered in the DAB process for the MSII decision?

Answer. Discussions with countries which express an interest in participation, as a result of the RFI, will be conducted on requirements and programmatics in parallel with the MSI Dem-Val phase. This will enable the US to make a decision on international participation prior to commencement of the EMD phase. In addition, several foreign companies, with components well into the development process, are presently teamed with US companies expected to compete for one of the two MSI Dem-Val contracts.

This strategy will place us in a very advantageous position at the MSII decision in approximately two years. Thus by the MSII DAB, DoD will have further evaluated: (1) US industry concepts, which in some cases will capitalize on foreign technology; (2) foreign interest in participating in the AIM–9X program through a bi-lateral arrangement; and (3) any available all-up missile rounds, such as ASRAAM. All of this data will be assessed to determine the best course of action.

Any potential decision to enter into an agreement with another country will be based on mutual operational requirements, shared development costs, and possibly foreign company participation in the MSI Dem-Val. US and foreign industry inputs would weigh heavily in determining the workshare for any missile development. Potential alternatives include: (1) a foreign country bi-lateral agreement in the US led AIM–9X program beginning with the EMD phase and involving a production share agreement; (2) a US bi-lateral agreement in a development program led by another country and including a production share agreement, (perhaps in an existing program such as ASRAAM or a new start); (3) the US procurement of an existing/fielded missile.

The currently structured AIM–9X program enables us to continue with the immediate Dem-Val on the seeker while simultaneously examining opportunities for international development/production.

[CLERK'S NOTE.—End of questions submitted for the record.]

TUESDAY, APRIL 12, 1994.

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, DEFENSE AGENCIES

ADVANCED RESEARCH PROJECTS AGENCY

WITNESS

DR. GARY DENMAN, DIRECTOR, ADVANCED RESEARCH PROJECTS AGENCY

INTRODUCTION

Mr. MURTHA. The Committee will come to order.

The Committee will now hear testimony from Dr. Gary Denman, Director of the Advanced Research Projects Agency, concerning the budget request in fiscal year 1995 for about $2.7 billion. $625 million included in that amount for defense conversion will be addressed in a separate hearing tomorrow.

ARPA has the exciting mission of performing high risk research that has high potential payoff for the military services. ARPA also has an excellent track record of delivering high-quality, innovative products.

We will put your entire statement in the record. Please briefly summarize your statement for us now.

SUMMARY STATEMENT OF DR. DENMAN

Dr. DENMAN. Good afternoon, Mr. Chairman and members of the Committee.

As the Director of ARPA, this past year has been both exciting and challenging. ARPA has been asked to assume an even larger leadership role in our Nation's overall technology program, not only in direct support to DOD, but to support activities of benefit to the national economy. We take this challenge seriously and hope that our 1995 program will continue the progress we have made in this regard.

I view ARPA's role as a change agent. Our fundamental job is to cause fundamental change in the way we look at and implement our defense capabilities and to bring innovative technology forward to application, both military and commercial.

The program today has four main themes. Information technology in a broad context remains our number one investment area, followed by an area where we have caused major increases over the last three years. I call this area affordable defense technology, and it requires that we work the affordable part of technology development concurrent with the development of new capabilities.

The third theme is what we call the dual-use strategy which is to try to implement broader DOD strategy to develop an integrated industrial base where we can draw more from the commercial sector and thus, when we develop technologies, we do that with an eye towards commercial potential.

The area ARPA is most noted for is application of these technologies to defense capabilities. We have described our program in three categories in my longer written testimony.

First is core technologies, the basic technologies for developing the defense infrastructure and finally the military applications.

The core technologies part of our program represents an aggressive attack on developing and exploiting information technologies as well as a few other high-leverage areas. This includes the high-performance computing and communications program, which is one of our largest initiatives, to develop scalable computing architectures for the future.

Supporting software for that concept as well as software engineering remains a key part of our program.

Electronic packaging is something we have grown from almost zero two or three years ago to a $80 million program. We are taking the next step beyond microelectronics to develop new packaging techniques. Currently packaging is done offshore and our goal is to bring as much as possible onshore.

Microelectronics, through the SEMATECH program, is a substantial part of our investment to ensure that defense has access to the leading edge in microelectronics.

We are beginning an emphasis on low-power electronics in order to provide portable usage of electronics for our military.

Another new area is something we call microelectromechanical devices, a brand-new technology area which uses processing technology for microelectronics and builds that into mechanical systems. Some of the early applications are microminiature acceleration accelerometers.

High definition displays is another major investment that we began several years ago with the assistance of the Congress. It is now a program within our budget at an aggressive level of about $70 million.

We have had enormous success in microwave devices. We believe ARPA has generated an industrial base in the United States where today defense is the primary market; however commercial use of microwave or MIMIC devices is exploding.

Finally, we have a reasonable and growing program in materials. Today we are focused on composite materials for multiple defense applications.

The second area I have called defense infrastructure, which can be thought of as key enablers, techniques for design and manufacturing tools and strategies.

We have started a program in defense health care focused on trauma care for the battlefield. This is the part of our program that provides test beds and supporting approaches for the National Information Infrastructure concept.

Finally, in military applications, we continue to invest in the ASTOVL program, short takeoff and vertical landing.

We are just completing a risk reduction phase and a decision to move to a demonstrator will be made in cooperation with the JAST program in fiscal year 1996.

Under a program we call WAR BREAKER, we are working on the front end of the precision strike problem to identify and target very rapidly mobile and other high-value targets.

We expect to be able to use a number of the technologies from precision strike to augment a new initiative in fiscal year 1995 to develop concepts to support counterproliferation initiatives.

We are applying a great deal of our information technologies in the command and control world and we are looking to a new initiative called Operations Other than War, which is support to peacekeeping-type operations.

Finally, as many of you know, ARPA was the catalyst in developing a concept called distributed simulation. We are now exploiting that concept in what we call Synthetic Theater of War where we are taking our test ranges, integrating those with vertical components in order to rehearse and train our forces in multiple scenarios, and doing this at much lower cost than is done today.

The Technology Reinvestment Project (TRP) has been the cornerstone of the larger integrated industrial base strategy of the Department and part of our overall dual-use development activities.

This program consists of developing technologies, spinning out defense technology, making defense use of commercial products and processes, and finally new dual-use development opportunities, all done in the context of integrating defense and commercial base.

It is a significant part of program in deploying technologies, particularly to small- and medium-sized firms, and we have a significant part of the program aimed at manufacturing education and training, all executed in cooperation with five other agencies of the government.

We started our fiscal year 1993 program late in the year. We selected 212 programs for a total of $605 million in the first round of this program, and it is all cost-shared. Therefore, it is a total program of $1.5 billion which we are now moving to put on contract.

We have $100 million of our fiscal year 1994 TRP program under contract as of today and it is growing very rapidly.

We had a massive response to the FY 1993 TRP program. We received approximately 3,000 proposals with 15,000 participants total across all proposals. With the cooperation of the other agencies, I think we were very successful with sorting through those proposals and picking the best of the best.

I think the major result from this activity was establishing a dialog across the Nation between both local governments, small and large industries, and in many ways that dialog is continuing and I get reports of that every day.

For 1994, the President has submitted a total technology reinvestment budget of about $600 million. One of the things we want to do to improve the program is to increase the success ratio for industry. We only awarded 5 to 7 percent of the proposals submitted and we believe we must increase this the 30 to 50 percent range.

We also need to increase small business participation in the program.

To increase the success ratio, we are focusing our topics better, having workshops with industry and asking industry to submit white papers so that we can pre-screen proposals.

For small business, as a result of 1994 legislation which we hope will continue in 1995, we are using SBIR dollars as a cost share for this program where in previous times it had to be fully cost-shared from private sources.

We plan two solicitations in 1994. We recently announced one for $150 million and the second broader announcement in July will commit the balance of the 1994 program and most of the fiscal year 1995 funds. This will put us on a better fiscal year basis with the TRP program.

Finally, the TRP strategy, while it is a large program, it cannot reduce areas where we have concerns. We believe we must focus this program on areas that are key to defense and that have potential for commercial products.

Finally, let me raise two management challenges that I face at ARPA. The first challenge is manpower. We have had substantial growth in the ARPA program with the budget now reaching over $2.7 billion.

Our manpower is increasing and I have been given the authority to increase our manpower to match the budget. However, hiring from industry today is very difficult, due in part to the revolving door laws where people perceive they cannot be rehired in their industry if they come to government.

I believe the second issue is serious. ARPA has decreased flexibility, even though our budget is increasing, to respond quickly to new opportunities. I believe this flexibility is the cornerstone of ARPA.

Today, 70 percent of our programs are restricted in one way or another by congressional actions, as a result, I am unable to move towards new opportunities as they emerge.

I would ask your attention to this problem.

This concludes my verbal statement.

[The statement of Dr. Denman follows:]

Statement by

DR. GARY L. DENMAN

DIRECTOR

ADVANCED RESEARCH PROJECTS AGENCY

Before the

SUBCOMMITTEE ON DEFENSE

HOUSE APPROPRIATIONS COMMITTEE

April 12, 1994

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INTRODUCTION

Good morning Mr. Chairman, Members of the Subcommittee, and staff. I am pleased to appear before you today to outline the Advanced Research Projects Agency's (ARPA's) program and to share my vision of the underlying investment strategy that guides this program.

ARPA'S GUIDING PRINCIPLES - By strictly maintaining a set of guiding principles, ARPA has a three-decade history of major contributions to Defense technologies and to the economic health of the Nation.

- Paramount is ARPA's role as an agent for fundamental change. Examples are the creation of stealth technology and networking technology. Fundamental changes can lead to new weapons systems, new tactics and doctrine, and new ways of manufacturing both defense and commercial products.

- The second guiding principal is our focus on investments in critical areas that will have the greatest impact for Defense and for the economic well being of the Nation. We have maintained ARPA as a small organization with no laboratory structure. This allows us to rapidly respond to new opportunities, but it also means that we have to carefully select only the highest priority initiatives in which to investment.

ARPA'S INVESTMENT THEMES: As we prepare for our FY 1995 program, there are four broad themes that pervade much of what we plan to do:

- **Exploit Advanced Information Technology**. The strategic importance of advanced information technology can not be disputed; our national and economic security are increasingly reliant on our ability to have the information we need, when we need it. For three decades, ARPA's investments in information technology have provided the Department of Defense (DoD) and industry with the most advanced computing technology in the world. We are committed to continuing a strong research program in information technology, and to applying this technology to a broad set of applications. Our programs in command and control, design and manufacturing, surveillance, the National Information Infrastructure (NII), and simulation are a few of the applications that are critically dependent on information technology. Our advances in information technology have been enabled by our ever-increasing capabilities in electronics, networks, scalable high performance computing and intelligent systems technologies.

- **Create Affordable Defense Technology**. In the rapidly changing national defense environment and declining defense budget, technological superiority is even more important than in the past; however, high technology alone will not be sufficient to meet the national security challenges of the next decade. The affordability of military systems will ultimately be one of the defining factors that determines the future force structure.

A few years ago, our program was focused almost exclusively on advanced capability. Today our focus is heavily on affordability with an emphasis on developing manufacturing technologies and processes to reduce costs. We are investing in technologies for flexible manufacturing, integrated product and process development, and cost-effective manufacturing solutions that are independent of production volume. These are technologies that can reduce component costs, especially electronic components. We are also investing in other technologies that are critical to enhancing affordability such as advanced distributed simulation for virtual prototyping, virtual manufacturing, and better performance/requirements tradeoff analyses.

- **Exploit Dual-Use Technologies** - The DoD will become increasingly dependent on the commercial sector for many of the technologies and components used to develop defense systems. ARPA will continue to invest in the creation and utilization of this dual-use technology. The Technology Reinvestment Project (TRP) and our other core technology investments, will significantly contribute to the viability of military systems, including those military systems which have no commercial counterpart, such as submarines, by fueling the integration of the military-commercial industrial base at the component technology level. The DoD can no longer afford to define and sustain a defense industry solely set apart from civilian industry. Central to this dual-use strategy is to invest in research and development so that the resulting products lead to simultaneous or complementary improvements in both defense and civilian products.

- **Transfer Technology to Defense Systems** - More than any other time in ARPA's history, technology advances must translate into cost effective fielded systems with enhanced capabilities and greater flexibility and reliability. We remain committed to developing and demonstrating key military capabilities. Our goal is to bridge the gap between our science and technology initiatives and specific military needs. We are focused on doing this through integrated research and development, by performing critical experiments and systems demonstrations to assess the military value of technologies, and by extensively involving the military user community early on to insure technology transfer and a clear concept of operation. Our focus is consistent with the DoD's new technology demonstration initiatives known as Advanced Concept Technology Demonstrations (ACTDs), which are designed to bring technologists and war fighters together earlier in the development process. This provides users a rich context in which to evaluate technologically-based opportunities for potential changes in operations, tactics, modernization, training, and doctrine.

Our investment strategy supports Secretary Perry's five principal priorities to: (1) implement the bottom up force structure; (2) protect the force to sustain a strong readiness capability; (3) redirect the modernization program to sustain a strong science and technology program, invest in next generation systems, focus on near to medium requirements for theater missile defense, maintain a strong intelligence program, and maintain selected elements in the industrial base; (4) execute business more responsibly and effectively; and (5) reinvest defense dollars in dual-use technologies. These priorities, together with the Joint Staff's set of five high priority Warfare Capabilities clearly articulate the Department's strategy in response to the changing global environment. I believe ARPA's investment program will position us to effectively and responsibly meet the future defense needs defined by this Administration.

ARPA PROGRAMS

ARPA invests in programs that can be grouped loosely into three categories: *Core Technologies*, *Infrastructure*, and *Military Applications*. These categories serve to provide a broad grouping of the research thrusts at ARPA and are not meant to be all inclusive.

A. Core Technologies - Core Technology areas include technologies in which ARPA has made sustained investments for many years and which must continue to be supported in order to maintain US military superiority. ARPA will continue to have major investments in Information Technology, Electronics Technology, and Materials Technology that will enable the DoD to rapidly and cost effectively develop, acquire, and maintain the next generation military capability such as advanced radars, multi-spectral sensors, and command and control systems. Manufacturability and affordability are as important as meeting performance, size, and weight requirements. Increased emphasis will be placed on achieving these capabilities through experimentally compatible manufacturing processes. Most of ARPA's Core Technology programs are dual-use technologies and augment the Technology Reinvestment Project (TRP) initiatives.

1. Information Technology - ARPA continues to invest in information technology and exploit the power of information technology in a wide range of applications, including simulation, design and manufacturing, health care, critical mobile targeting, surveillance, and many other areas. Our strategy is to create the enabling technologies and to insure that we have a robust industry that can supply the necessary products for leading-edge DoD applications. This is especially true in the High Performance Computing program where the creation of a scalable computing technology base represents a paradigm shift from sequential processing into the use of parallelism. The National Information Infrastructure (NII) is a new area of investment, but one which draws on extensive ARPA investments in

networking, computing, and software technologies. Our goal is to participate with other agencies to evolve the NII into a national capability that can support Defense needs as well as those of the commercial sector. The ARPA NII contribution will be in the area of high performance networking technology, software services to support interoperability across applications, and pilot projects for selected application domains.

a High Performance Computing and Communications - Many of our primary efforts in information technology are embodied in the High Performance Computing and Communications (HPCC) program, where we have focused on developing high performance computing elements that can be arrayed and scaled to achieve ever higher levels of performance. At the heart of today's most powerful massively parallel machines are the same microprocessors found in relatively inexpensive desktop workstations and personal computers. And the high speed interconnection technology found in these scalable machines will form the basis of tomorrow's high speed communications network switches and processor cluster interconnections. Our FY 1995 program has been expanded and will continue the aggressive development and implementation of US-based computing capability. Four areas will receive expanded investment: 1) embeddable systems that will exploit the dual-use commercial base to dramatically improve military high performance computing; 2) networking technology that adds security, high performance experimental testbeds, and scaling for additional users in mobile and wireless configurations, 3) increased software activities to exploit the state-of-the-art compiler, library, operating systems, object management systems and environments; and 4) computational prototyping technology which is now ready to be exploited for complex problems.

b. Software Initiatives - Crucial investments are also being made in software technologies that will significantly improve our capabilities to cost effectively acquire, deploy, and maintain operational software systems. These programs are centered on developing architecture based development approaches that will allow the rapid construction of application software systems from well-specified interfaces, commercial off-the-shelf software (COTS), domain specific components and high level domain specific languages. Complementary efforts address improving the ability to prototype aspects of software prior to actually building systems, developing techniques to greatly facilitate user involvement in software life-cycle evolution, and developing advanced integration techniques to better enable software tools to work together. In addition to development, we are actively evaluating and transitioning those technologies that appear to be maturing. This transition is accomplished through detailed demonstration projects with the Military Departments and is accomplished under real world conditions and constraints. Several of the techniques being used (domain analysis techniques and associated reuse support tools, layered software infrastructures, and product line development approaches) have already demonstrated significant productivity and quality increases. ARPA intends to use this and similar approaches as a standard means of maturing software technology to the point of production use and commercial spin off.

In FY 1995, under our Software Technology for Adaptable, Reliable Systems (STARS) program, we will complete initial integration of software reengineering and reuse technologies; develop at least one example of layered software infrastructure; evaluate and introduce into use three application systems using our software product line philosophy; and commercialize several software tools and environments resulting from our development activities. We will also validate at least one advanced prototyping language and architecture description language and will deliver techniques to help developers assess, evaluate, and mitigate risk in software systems development.

c. Intelligent Systems - An intelligent system is a software-based system that uses artificial intelligence methods to assist human problem solving. The goal of our intelligent systems research is to enable such systems to be built easily and to assist humans in solving complex problems in a variety of military and dual-use domains. Such systems will be easy to use since they will support "hands-free" computing (that is, natural interaction through spoken language and multi-media interfaces). We have a robust program in intelligent systems focused in five areas: 1) spoken and written language technology, 2) image understanding, 3) human-computer interaction, 4) planning technology, and 5) information integration technology. In FY 1995 we will continue to extend the functionality of these intelligent systems technologies, as well as continue to demonstrate applications in domains such as command and control, health care, manufacturing, and autonomous vehicle control. Also in FY 1995 we will investigate a new demonstration application for intelligent systems in training and education.

2. Electronics Technology - Supportive of our investments in information technology are the numerous investments ARPA sustains in electronics technology. The goal of our electronics technology program is to develop the capabilities necessary to produce smaller, lower power, more mobile, and more affordable defense and commercial systems. Semiconductor and integrated circuit technology and low-cost physical electronic packaging that yield high performance multiple circuits, as well as the associated manufacturing process technology necessary to produce these products at an affordable cost, are being pursued. Microelectromechanical Systems and High Definition Systems, both important ARPA programs, are also being pursued under our electronics technology program.

a Electronic Packaging - Several ARPA programs can be grouped into the electronic packaging area. Following are three of our most critical programs in this area:

(1) Application Specific Electronic Modules (ASEM). - The ASEM program goal is to insure the existence of an end-to-end capability to rapidly acquire electronic modules and subsystems. In addition to integrating the key capabilities of design, manufacturing, and test, the program also addresses the information technologies and infrastructure needed for rapid acquisition. In FY 1995 we will heighten our emphasis on mixed signal modules and application demonstrations.

(2) Multichip Modules (MCM). - The MCM program will produce an order-of-magnitude reduction in manufacturing cost, developing a domestic supplier infrastructure, and accelerating the acceptance and insertion of advanced multichip module technologies. We are focusing on further development of manufacturing equipment and plan to deliver production modules for military aircraft in FY 1995.

(3) High Density Microwave Packaging (HDMP) - New approaches being pursued under the High Density Microwave Packaging (HDMP) program are expected to reduce microwave packaging costs by as much as 75 percent while providing excellent electrical performance. Packaging is a major component of the cost of microwave frequency systems. A particular challenge is to meet, at the lowest possible cost, demanding electrical performance requirements without incurring excessive signal losses. The FY 1995 program is focused on the continued development of microwave frequency multichip module housings, internal packaging interconnections, array interconnect technology, module assembly and integration, and computer aided design tools and databases.

b. SEMATECH is the premiere example of ARPA's sponsorship of a true dual-use technology program through cooperative partnerships and cost sharing with industry. This partnership includes companies that supply the majority of the integrated circuits in the US. ARPA's FY 1995 efforts will continue to focus on the manufacturing tools and methodologies needed for low-cost, flexible, scalable manufacturing to meet defense and commercial needs. Emphasis will be on combining advances in manufacturing equipment with software innovations to enable state-of-the-art microelectronics manufacturing facilities capable of producing many part types in rapid turn-around time and with reduced cost sensitivity to manufacturing volume. The primary strategy at SEMATECH is to stay very focused on sustaining the improved productivity trends that the industry has achieved over the past number of years. These productivity gains are, in large part, a result of improved processes, equipment and factory integration. These areas will continue to receive priority investments at SEMATECH, with a large portion of the joint industry/government funding going to key industrial suppliers.

c. Lithography is one of the most critical components of semiconductor manufacturing lines in terms of achieving desired competitive product capabilities. It is also one of the highest cost areas in terms of both capital equipment costs (typical systems can be over $1 million) and development costs for the next generation systems. This past year has been extremely volatile. The number of industry players has declined dramatically, and one player has announced intent to partner with foreign firms. Currently Japan (Nikon and Canon) dominates this market. In the US, it appears that only Silicon Valley Group (SVG) will be competitive for leading-edge lithography systems. Since this industry shake out, two aspects have unfolded:

- The Semiconductor Industry Association (SIA), in cooperation with SEMATECH, has taken on the job of rebuilding the industry investment strategy.
- US industry is increasingly expressing its intention to work with SVG, primarily through equipment purchases.

Given this unstable industry status, ARPA has reduced its support to lithography in FY 1995; however, we are aggressively working with the industry to redefine an investment strategy. We are confident that this strategy will be in place for our FY 1996 budget cycle.

d. Microwave and Analog Front End Technology Program (MAFET) is a new start for FY 1995. The program will build on successes of the Microwave and Millimeter Wave Monolithic Integrated Circuits (MIMIC) program and, for the first time, will result in the capability to produce an affordable, all-weather fighting capability; very compact, lightweight, low cost active arrays for radar, communications, and improved missile accuracy; and to integrate multiple military system functions effectively and inexpensively. Dual-use applications exist for safety, communications, and medical devices and procedures.

e. Low Power Electronics - Working with industry and other DoD components, ARPA has defined an innovative program in low power electronics to develop the technology base. The goal is to reduce power dissipation to one percent of that used in current state-of-the-art microelectronic based systems. This program responds to industry's recognition of power dissipation as a showstopper in next generation, portable electronic products.

f. Microelectromechanical Systems (MEMS) - ARPA's MEMS program is using the same fabrication processes and materials that are used to make microelectronic devices. It conveys the advantages of miniaturization, multiple components, and integrated microelectronics to the design and construction of electromechanical devices. We are pursuing applications in miniature inertial measurement units for personal navigation, mass data storage devices, miniature analytical instruments, non-invasive medical sensors, fiber-optic network switches, and distributed unattended sensors for environmental and security surveillance. In FY 1995 we will lower the barriers to access and commercialization of MEMS applications by developing an infrastructure to support shared, multi-user design, fabrication and testing.

g. High Definition Systems (HDS) - ARPA's HDS program encompasses the development of a wide variety of associated technologies including displays, display processors, sensors, software, packaging, and manufacturing. The program's overall goal is to achieve a design and manufacturing capability that can provide for and sustain the affordable use of high definition technology in DoD systems in the late 1990s and beyond.

Display efforts include improved cathode ray tubes; flat panel and head mounted displays using active matrix liquid crystals, electroluminescence, plasma, and cold cathode technologies; projection displays using digital micromirrors, liquid crystals, and laser projection; as well as efforts in manufacturing and enabling technologies. We are developing strategies that will provide incentives to industry to build product facilities for the dual-use market.

h. Infrared Focal Plane Array Program - This program will establish a flexible infrared (IR) focal plane array fabrication capability which can respond to rapidly changing system requirements by producing IR images at affordable cost, independent of the production volume. The capability will encompass IR semiconductor manufacturing, cryogenic packaging, and sensor assembly, integrated with a factory control system. In FY 1995 we will complete the assembly of this advanced manufacturing facility and begin preparations for comprehensive process testing and verification.

3. Materials - ARPA has a focused program in materials and processes that promises to improve the manufacture and performance of materials that have the highest payoff for military systems. This includes investments in both structural and electronics materials. Our investments in structural materials, especially composites, concentrate on improving cost effectiveness of processing and manufacturing as well as on improving the physical performance in terms of strength-to-weight, durability, thermal capability, and geometric tolerances. Our investments in electronics materials focus on improving manufacturability, reducing size and weight, increasing speed, reducing system complexity, and lowering overall cost for electronic and optoelectronic components and systems. Highlighting our FY 1995 program is our research in metal matrix and advanced polymer matrix composites and high temperature superconductivity.

B. Infrastructure, our second investment category, refers to those technologies and capabilities that enable the DoD to produce its materiel and train and care for its personnel. With the drawdown of forces and decreasing defense budgets, there is a critical need to invest in research and development that can make the DoD infrastructure effective, efficient, and affordable. The trend will continue to move toward a shared national infrastructure with greater reliance on the civil sector to support defense needs. Our investments in the defense infrastructure include design and manufacturing, health care technologies, education and training, and technologies that support the NII.

1. Design and Manufacturing - ARPA has several design and manufacturing initiatives continuing in FY 1995. Our goal is to invest in design and manufacturing technologies that will reduce product life cycle costs by improving design efficiency and factory operations. For example, we are developing and demonstrating an integrated suite of computer-aided design/computer-aided engineering workstations for integrated product and process development (IPPD) and in technologies for advanced engineering

and manufacturing design. These capabilities will support rapid product redesign in response to changes in requirements; facilitate performance, cost, and schedule tradeoffs in product development; and ultimately result in product and process models that can be shared, reused, and merged with other models. Another more specific manufacturing application will demonstrate the ability to substantially reduce the cost and development schedule of high performance electromechanical devices, such as missile seekers.

2. Defense Health Care Technologies - We have initiated a five-year program to focus primarily on battlefield combat casualty care and a synergistic research development effort for a health care information infrastructure. Our efforts in battlefield combat casualty care will enable remote diagnostic and imaging capabilities, telesurgical-mentoring and remote telepresence surgery, and the exploitation of virtual reality and computer generated human body simulators to allow combat surgeons, medics, and others the opportunity to "train and practice" combat casualty care. Our efforts in health care information infrastructure are designed to enable the transfer of information in the battlefield through the development of a clinical associate and are designed to connect proactively to medical and health knowledge bases to support its users.

3. Education and Training - We will focus technologies that will improve the delivery and quality of education and training systems by leveraging advances in simulation technologies combined with advances in networking, artificial intelligence, collaborative software, authoring tools and software engineering. Our goal is to combine these advances to provide inexpensive and flexible education and training systems, quickly tailorable by both trainers and students, that is accessible -- online and on demand for research and instruction.

4. National Information Infrastructure (NII) - The final infrastructure investment area ARPA is focused on is the National Information Infrastructure. Here ARPA is investing in a number of vital research programs in the areas of networking technologies, a variety of services which exploit the use of networks, and applications which are critical to both DoD and the commercial sector. To meet the needs of the NII, ARPA is working with the research and business communities to produce networking technologies to interconnect high performance computing systems as well as extending today's technology to meet the requirements of nationwide and global networking. Research programs seek to develop proof-of-principle demonstrations of advanced infrastructure capabilities. These demonstrations, often in the form of advanced testbeds, provide experimental infrastructure capabilities which can then be formalized and systematized into broad coherent information platforms. These testbeds and models are developed in cooperation with industry to accelerate their transition into commercial off-the-shelf products and services that provide the greatest possible economies of scale to suppliers and end users.

C. **Military Applications** - The final investment area category, military applications, includes innovative technology development in support of improved, affordable military capability. These investments focus on combat vehicles, surveillance systems, command and control systems, counter proliferation concepts, and precision strike capabilities. Applications cover the broad spectrum of military focused investments -- from a component system such as a radar, to an aircraft or ground vehicle, to a "system of systems" (i.e., a system created through the integration of assets designed to address complex military operations, processes, and problems).

1. Short Take-Off, Vertical Landing/Conventional Take-Off and Landing Common Affordable Lightweight Fighter - The Common Affordable Lightweight Fighter (formerly ASTOVL) is paving the way toward fielding an affordable joint strike fighter for the Air Force, Navy, and Marines. At the heart of this concept is the short takeoff, vertical landing propulsive lift system. For the Naval Services variant of our concept this system replaces the structure required to enable shipboard arrested landings and catapult takeoffs. The propulsive lift system weighs about the same as the keel structure, high lift devices, and high-sink landing gear it replaces; however, it is designed as a removable module to be replaced by additional fuel capacity (and attendant combat range) on the Air Force variant of the aircraft. We believe this innovative approach will permit the Air Force to field an aircraft that shares a common airframe, engine, and avionics with the Naval Services. As part of this program, ARPA is also exploring innovative design, manufacturing, and management techniques to reduce costs and improve quality. Future efforts for an aircraft demonstration, if proposed, will be cooperative with the Joint Advanced Strike Technology (JAST) program.

2. Simulation-Based Ship Design - The Simulation-Based Design (SBD) Program integrates advanced computational and simulation technologies and enables remotely distributed, collaborative teams to jointly conceive and design a ship and a ship production system using computer simulations. SBD also permits the design to be thoroughly tested in a virtual environment simulating actual operational conditions. This will reduce or eliminate the need for costly physical mockups. The simulations can also be used throughout the life of the ship to plan for and reduce the time and cost of layout, construction, operation, maintenance, and training.

3. Precision Strike and Counter Proliferation - ARPA is addressing two critical military capability needs as specifically outlined in the Joint Chiefs of Staff Capabilities requirements document. These are precision strike with emphasis on time critical targets and counter proliferation of weapons of mass destruction. Enabling these capabilities requires highly integrated systems. Also, both of these applications depend on surveillance technologies, that include major emphasis on sensors such as advanced radar, electro-optical and infrared sensors, miniature ground sensors, and technologies that will turn sensor data into information to support civilian and military decisionmakers at the national, theater, and operational levels.

ARPA's Counter Proliferation and WAR BREAKER Programs are being developed as two complimentary applications operating at different points along the peace-crisis-wartime continuum.

a Counter Proliferation - Programs are being planned to support detection, monitoring, and interdiction of states and extra-national organizations producing or acquiring weapons of mass destruction. Operating during peacetime and crisis, such a system will include specialized sensors, data correlation and information fusion, process models and simulation, and response option technology. The investment strategy for counter proliferation concepts involves identifying and customizing efforts underway in ARPA's traditional technology base of information, electronics, and manufacturing technology. The program is an agency-wide program with potential technology insertion points in the Intelligence Community, DOD, the Military Departments, and the Departments of State and Commerce. This is a new initiative for FY 1995.

b. WAR BREAKER - WAR BREAKER demonstrations are aimed at the crisis and wartime portions of the peace-crisis-wartime continuum. The WAR BREAKER goal is to support national and theater commanders with: (1) sensors that can locate time-critical targets despite their inherent mobility and the employment of operational deception techniques, (2) information processing technology that provides "actionable intelligence" allowing US and allied forces to operate inside the strike cycle times of an opponent's weapon systems, and (3) the next generation of smart weapons that target a wide range of manned and unmanned precision strike options. One of the many time-critical targets WAR BREAKER technology is focused on is potential delivery systems for weapons of mass destruction that can be used against US deployed forces or regional allies. ARPA's Counter Proliferation Program provides a front-end for WAR BREAKER's precision strike technology by supporting warning, vulnerability assessment, and option generation, while WAR BREAKER supplies the hardware and software to counter weapons of mass destruction once they enter a potential adversary's force structure. In FY 1995 we will initiate a low cost radar program aimed at improving wide area surveillance for the detection and classification of time-critical targets. We will also field components for an integrated intelligence correlation system, and will work closely with the Army to demonstrate WAR BREAKER battle management technology.

4. Command and Control Technologies - Building on past investments in information, electronics, and surveillance technologies, ARPA will develop command and control technologies and concepts that will significantly improve battlefield management and provide superior decision support to commanders. In our efforts to address the information needs of commanders and their staffs in the post cold war era, we are focused on technologies that will provide commanders rapid, wide-area communications; ready access to and analysis of distributed inhomogeneous databases; an ability to perform rapid, automated planning functions with physically separated personnel from all three Services (collaborative planning); the

location, status, and direction of friendly and enemy forces on electronic maps (situation awareness); and access to models and virtual environments and imagery from various sources. We are also focused on the development of intelligent decision aids and planning tools to support joint crisis management planning and execution. Rapidly evolving doctrine for crisis management, in particular for Joint Task Forces, provides a critical domain in which to develop new planning and decision aiding technology using evolutionary software development methods and advanced artificial intelligence methods. We are working closely with nondefense crisis management agencies (i.e., the Federal Emergency Management Agency and the Department of Justice) to insure dual-use application of our intelligent decision aids and planning tools.

5. Other Military Initiatives

a Operations Other than War (OOTW) - ARPA is beginning a program to address new capabilities needed in Operations Other than War (OOTW), such as peacekeeping, peacemaking, and disaster relief. Today's soldier often finds himself immersed in situations with uncertain and sometimes conflicting objectives. Our forces are called upon to perform missions under rules of engagement that require considerable restraint in the face of an unpredictable and often dangerous elements. Except for the fact that they occur on foreign soil, these missions frequently resemble law enforcement scenarios more than the battles for which our soldiers are trained and equipped. The challenge is to develop and apply technologies which will enable our military to operate in relative safety and with deliberation, exerting only the force necessary to do the job. In response to this challenge, ARPA is focusing on five areas of capabilities enhancement: information systems, sensors/surveillance/detection, mission kill/less-than-lethal systems, protection, and simulation. We will adapt technology being developed throughout ARPA such as the Low Cost Uncooled Sensor Project (LOCUSP), Microelectromechanical Systems (MEMS), autonomous translation, and biomedical systems to meet the special needs of OOTW. The convergence of mission scenarios and operational needs between the military and law enforcement communities is prompting a Memorandum of Understanding between the DoD and the Department of Justice to pursue mutually attractive technologies. This will result in an exciting joint-agency program which ARPA will lead on behalf of the DoD.

b. Littoral Warfare Efforts - ARPA's littoral warfare programs are focused on improving the performance and affordability of shallow water anti-submarine warfare (ASW) and mine countermeasures systems. These ASW programs are optimizing sonar performance within the limitations imposed by the shallow water environment and developing the complex information processing systems needed for an integrated display of the ASW scene. Technologies are also being developed for clandestine mine hunting and neutralization by unmanned vehicles in shallow water. To enhance the effectiveness of unmanned vehicles for littoral warfare, ARPA is developing a fuel cell to provide a four-fold increase in endurance as well as advanced underwater communications to provide a 50-fold increase in data rate.

c. Synthetic Theater of War (STOW) - The Synthetic Theater of War (STOW 97) is the lead element in ARPA's Advanced Distributed Simulation program which is designed to exploit rapidly evolving communications, software, and computer technologies into a simulation-based system of systems which will significantly alter the way DoD does business. Based on virtual simulation technologies proven in the earlier ARPA Simulation Network (SIMNET) program, STOW is developing a simulated, complex highly dynamic multidimensional battlespace which portrays doctrine with virtual and live forces in a single seamless environment that possesses all the essential characteristics of the real battlespace. It will integrate live, virtual, and constructive simulation in late 1997 to demonstrate the capability to train the headquarters elements of a Joint Task Force. In FY 1995 we will begin our formal STOW systems engineering and integration effort, and the development of component force representations to be integrated into the final system.

TECHNOLOGY REINVESTMENT PROJECT (TRP)

In FY 1995 the Technology Reinvestment Project (TRP) will continue to be the cornerstone of our dual-use technology investment strategy. We will continue to lead the TRP, with implementation by the multi-agency Defense Technology Conversion Council, whose members include ARPA (Chair), the Departments of Commerce (NIST), Energy, Transportation, the National Aeronautics and Space Administration, and the National Science Foundation.

A **TRP Strategy** - The TRP is rooted in the doctrine that our defense strategy depends on maintaining technological supremacy over those who threaten our security. Its ultimate objective is to preserve defense access to our most critical technologies even where the DoD can no longer afford to be the primary investor. It builds heavily on the recognition that much of the same advanced technology required by defense has great commercial potential which, in turn, will stimulate application of private sector expertise and investment. Consequently, we will vigorously pursue "dual-use" technologies with both purposes in mind from the very beginning. We have three major objectives:

- First, we want to reduce significantly the time and expense required to develop and mature critical defense technologies by attracting the interest and resources of the commercial sector to work with us as partners with common interests and shared risk -- a dual-use development strategy.
- Second, we want to build a "dual-produce" capability in the US manufacturing base by deploying new manufacturing technologies and methodologies that allow military products to be produced alongside commercial versions of the same product. By deploying these new techniques, especially to

small- and medium-sized firms, we intend to exploit existing, high-volume commercial markets to provide critical technologies back to defense at a price that is affordable.

- Finally, we hope to educate a whole new generation of manufacturing experts which will come to know "dual-use" and "dual-produce" as the routine way of doing business.

B. FY 1993 Status - The strategy outlined above is reflected in the three activity areas of the TRP (1) Development, (2) Deployment, and (3) Manufacturing Education and Training. To date 212 projects have been selected for negotiation, committing $605 million in Federal funds. This included all of the FY 1993 funds ($465 million), plus an additional $140 million from FY 1994, to insure that all proposals that were rated "highly recommended" at the end of the FY 1993 evaluation process were funded. Since each of these efforts must be cost shared by at least 50 percent, this represents a total project value of almost $1.5 billion.

1. In the Technology Development area, projects were selected to benefit the DoD in at least three ways.

- Spin-off efforts were selected for the purpose of preserving DoD access to critical technologies by creating or enhancing commercial markets for them.
- Spin-on projects were selected where there was evidence that, with additional development, the DoD could use existing commercial technologies.
- Dual-use efforts were selected for their potential in new technologies which enable both commercial and defense products.

If the TRP is examined from a technology point of view, several major themes emerge including National Information Infrastructure, Transportation and Health Care. TRP will make a significant contribution to the National Information Infrastructure (NII). About $95 million of the $350 million of Technology Development funds is going to projects to develop software or devices that directly support advances in the NII, while an additional $25 million is for projects to advance technologies that support the general industrial capability from which NII devices and hardware are developed. Transportation and transportation infrastructure proposals received over 35% of the Technology Development funding. All modes of transportation (aviation, shipping, rail and automotive) were represented. Health care has also emerged as another strong area with efforts in health care information as well as projects to improve health care diagnostics.

Because all the programs are cost shared, the actual funding applied to these areas as a result of the TRP selection is doubled. Furthermore, because all TRP projects are directed toward eventual productization and have a demonstrated commitment from the proposers, the impact of these efforts will be more immediate that traditional R&D programs.

2. Efforts in Technology Deployment, including the Manufacturing Extension Programs funded by TRP, are ensuring that small companies -- the backbone of the US industry, will have access to the technology and infrastructure they need to establish themselves in the new, dual-use arena. The Manufacturing Education and Training programs will also have a long-term impact on Defense industrial base as changes in manufacturing curricula begin to make US industry more competitive.

Deployment projects are aimed particularly at small- and medium- sized manufacturers who have the best opportunity to become "dual-produce" enterprises. The main objective is to help these entities identify and incorporate technologies of all kinds appropriate to their needs and level of sophistication so that they can compete in global-commercial environment. The interests of the DoD coincide greatly with the Department of Commerce and I expect that the National Institute of Standards and Technology (NIST), with our enthusiastic participation, will pick up the leadership of this important area.

3. Manufacturing Education and Training (MET) - The really new and influential ideas will enter our manufacturing processes partly because of projects like those funded in the MET part of TRP. These programs, built around our institutions of higher education but led by industry, will raise manufacturing to a level on a par with our other scientific and engineering disciplines.

C. **Lessons Learned** - As we assess the industry feedback from the FY 1993 program, two key areas for improvement have emerged.

1. We must improve the success rate of proposals in order to reduce the bid and proposal costs incurred by industry. The conservative estimate is that industry invested more than $100 million in proposal preparation and partnering.

2. We must improve the ability of small businesses to cost-share TRP efforts. I am hopeful that the provisions in the FY 1994 legislation permitting small business to use Small Business Innovative Research (SBIR) funds to cost share will have a major impact on this problem.

D. FY 1994 Program

In order to deal with the first issue described above, we are making changes to our implementation strategy in FY 1994. First, we plan two solicitations. Both solicitations will have a better focus of topic areas while, at the same time, sufficient breadth to permit the best ideas to flow. Also, we will hold workshops with industry in each topic area to convey our objectives to industry. For the first solicitation, we will include well-defined topic areas to make sure industry understands our needs. Also, in the second announcement we will use white papers to screen ideas before industry expends the resources to prepare full proposals.

In preparation for these announcements, we have concentrated our energies on defining the focus, or topic areas, for the expanded technology development portion of the program. For the first announcement, we have defined seven areas that we believe are clearly ready to move forward. The focused competition topics are closely aligned to complement our overall investment strategy. The topics include High Density Data Storage Systems, Object Oriented Technology for Rapid Software Development and Delivery, Interoperability Testbeds for the National Information Infrastructure, High Definition Systems Manufacturing, Low Cost Electronic Packaging, Uncooled Infrared Sensors, and Environmental Sensors. We have worked closely within our interagency group and sustained a continuing dialogue with industry to define these topic areas. The key selection criteria have been (1) military need, (2) a clear dual-use potential, (3) relationship to national priorities, and (4) sound technical ideas. We also considered gaps from the FY 1993 program and we are assuring compatability with the larger ARPA dual-use investment strategy.

We have recently announced the first 1994 solicitation aimed at technologies that are both critical to defense and that have clear potential for market growth. This competition should use about $150-$180 million of the FY 1994 funding. It will be followed this summer by a larger, more general competition that will use the remainder of our FY 1994 funds and provide proposals that might be applied to a substantial portion of our $625 million FY 1995 funds.

E. TRP in Perspective

Technology itself is not an end goal of the TRP. All three elements of our TRP strategy use technology to stimulate fundamental change. In the TRP, technology is a means to an end; that is we are using the TRP to stimulate integration of the defense and commercial industrial bases. The collaboration/partnership model is another important tool which we are using to move from the transaction- based model of the past to relationship-based models already in place throughout the rest of the world. Finally, the policy of cost sharing is an important stimulus, not so much because it doubles our investment, but because it guarantees the continued commitment of each participant by sharing both the risk as well as the benefit.

The creation and use of new legal authorities and instruments is another very important tool. For example, TRP is making extensive use of the "other agreements" authority provided to it by the Congress several years ago. This is one small piece of the much larger and more difficult job of procurement reform being considered by Secretary Perry and Deputy Under Secretary Colleen Preston.

While I have spent considerable time outlining what the TRP is, it is very important to say what it is not. Our mission is to stimulate the merging of the defense and commercial industrial bases into a single industrial base that can provide the highest performance military systems in the world at a low cost consistent with simultaneous commercial appeal. From the beginning, we have maintained that the TRP is driven by opportunity, not need. It was never our intention that the TRP would serve as "disaster relief" for beleaguered defense companies.

We realize that the TRP is not the whole answer. Our strategy depends heavily on the other and larger elements of the defense conversion/ reinvestment initiative. No one issue is more important or more difficult than enduring reform of the DoD procurement system. Base closure, laboratory consolidation, and community assistance are all critical pieces. The TRP is one of an array of mechanisms on which we depend.

MANAGEMENT CHALLENGES

A. Manpower and Personnel

1. The essence of ARPA is people, ideas, and organizational flexibility. The substantial growth in the ARPA budget, in the Technology Reinvestment Project, and other dual-use and military capability programs--together with the increasing emphasis on new contracting practices, government-wide collaboration, and greater program complexity--severely challenged our manpower resources last year. The exceptional ARPA technical, financial, and administrative staff has shared the burden of agency-wide increased workloads. Fully expected, the staff has demonstrated remarkable professionalism and dedication in rising to meet these difficult challenges. Fortunately, ARPA has been authorized an increase in staff and we are identifying and bringing individuals on board quality as quickly as possible. However, this process will likely take the remainder of the year to accomplish.

2. I am also concerned that the tour of duty for civil service program managers at ARPA is increasing. In 1978, 75 percent of the civil service program managers had been assigned to ARPA for less than four years, and only four percent had been with the Agency for more than eight years. Currently, 46 percent of the ARPA program managers have less than four years at the Agency and 19 percent have been in place for more than eight years. This is an unfavorable trend. The more stringent ethics regulations designed to close the revolving door between government and industry contribute to this trend; however, there are other factors involved. The recruitment of the best and brightest talent from industry is seriously hindered by the current disparity in pay and the lengthy and unwieldy government hiring process. This is particularly evident in attempting to recruit for the senior-level ARPA Office Director positions.

B. **Earmarks** - One of the key elements of ARPA's past success has been our ability to be focused and selective in the funding of research and development efforts. We simply cannot afford to follow all possible paths or single-handedly support all of the worthwhile science and technology in this country. We must continue to be the spawning ground for innovative ideas that have the potential to grow into programs of major impact to the DoD/civilian industrial base. Our ability to maintain this unique flexibility is being threatened. One of the most serious management challenges that ARPA continues to face is a result of Congressionally mandated budget restrictions. About 70% of our budget is restricted because of Congressional earmarks, Congressional fencing, or Congressional reprogramming directions. This results in a significant loss in flexibility to identify breakthroughs and move out quickly on promising technologies. In addition, specific earmarks contained in report language conflict with the required competitive process and demand enormous time and effort from the professional staff to discern the specific intent of the associated legislation and prevent program awards to the best proposals.

ACCOMPLISHMENTS

ARPA has a history of consistently pushing the outer boundaries of the most advanced technologies; the last year was no different. Our accomplishments year include both breakthroughs in core technologies as well as several system accomplishments. Some of these accomplishments are highlighted below:

1. **TAURUS** - On March 6, 1994, Taurus lifted off the pad at Vandenberg Air Force Base, California on its maiden voyage to place two DoD satellites into low-earth orbit. After a 10-minute flight, Taurus deployed the DARPASAT and Space Test Experiment (STEP) Technology for Autonomous Operational Survivability (TAOS) satellites into the targeted 290 nautical mile orbit. This event is extraordinary because the mission involved the combined demonstration of a new launch vehicle, two new satellites, new advanced space technologies, and new approaches to satellite operations. The impact is truly a fundamental change in the way space systems can be built, launched, and operated. ARPA successfully demonstrated capability and affordability.

2. **MEMS** - This year an ARPA-supported Microelectromechanical Systems (MEMS) project has developed motion-detecting components with the sensitivity and stability needed to build personal, inertial location devices. Augmenting existing GPS systems, MEMS-based inertial trackers will provide personal location information even under heavy foliage or in urban environments. Another ARPA project demonstrated a MEMS-based accelerometer capable of surviving and operating in the near 100,000 G accelerations generated by firing artillery shells. Such devices will provide affordable guidance systems to what are presently unguided munitions, thus increasing the effectiveness of these weapons and reducing

procurement and logistic costs. ARPA has also supported the establishment of a regularly scheduled, shared, MEMS fabrication service for domestic commercial and academic users. The service has allowed hundreds of students and industrial users, nearly half for the first time, to inexpensively and rapidly fabricate MEMS devices.

3. **MIMIC** - The MIMIC program has established a solid infrastructure for microwave monolithic integrated circuit (MMIC) technology. As a direct result of the MIMIC program, the US Army Space and Strategic Defense Command was able to select a solid state approach to the development of a large ground-based array radar. Over 68,000 solid-state modules for the system will be produced from June 1993 through January 1995. During the past year, a number of high performance millimeter-wave frequency MMICs have been produced on the program, including a high power, highly efficient power amplifier, and very low noise receiver amplifiers. Components such as these have enhanced the performance of millimeter-wave frequency weapon systems under development including both LONGBOW and SADARM.

Commercial applications for MIMIC have proliferated as well. During the past year, radar systems have been installed in school buses in several counties in Indiana. These systems warn school bus drivers when children are near the bus yet out of the driver's sight. The systems are assembled using the same flexible production line that assembles military radar transmit and receive modules. The school bus radar uses an adaptation of military radar chips, produced in the same MIMIC foundries that fabricate the military chips.

4. **MILITARIZED SCALABLE HIGH PERFORMANCE COMPUTING**- ARPA's High Performance Distributed Experiment (Hiper-D) and Embeddable Systems Programs continue to demonstrate results which have a major impact in the future deployment of military computing systems. For example, In March 1994, the Aegis program office, in coordination with ARPA, conducted an integrated demonstration of advanced distributed computing technology in an Aegis command and control system context. This major milestone showed that commercial computing technology, distributed computing, and fault tolerant replication can be applied to certain real- time command and control, as well as fire control systems. Demonstrations included interoperability between workstations and scalable computers from four vendors; functional correctness when faced with hardware and system failures; integration of two separately developed subsystems in to a working demonstration in record time; and portability of applications between personal computers, workstations and scalable computers. In addition, the Embeddable Systems program demonstrated that a new model of interaction can exist for military and commercial computing vendors. The first co-development of a commercial scalable computer and its military embedded variant was produced along with associated software development environments, providing more powerful and shorter development cycles. Early in FY 1995, the embedded Touchstone project will deliver the first

general purpose scalable military computer to support the tens to hundred gigaflop military applications.

5. **HIGH PERFORMANCE SCALABLE SYSTEMS AND SOFTWARE-** We continue to witness the transfer of ARPA-developed HPC technology to industry where we are now beginning to see solutions to very unique problems. Last year, Cray Research, Inc. announced the T3D, their first scalable system integrating vector and massively parallel processing technology. The key technology for this system was developed through a cost shared agreement with ARPA over the past three years, and the entire system was delivered in only 26 months. In addition, many other vendors are commercializing ARPA-initiated research, including Intel, Thinking Machines, Convex, Maspar, and Kendall Square Research. All are reporting major new codes supporting breakthroughs in the oil, scientific, financial, and medical fields. For example, models running on scalable machines have been used to discover new enzymes for medicine and oil deposits in the ocean, as well as helping in the design of aircraft, automobiles, and electromagnetic shielding. Key operating system software capabilities, based upon variations of the Mach microkernel, have been adapted and used by Intel, Open Software Foundation, Convex, and Microsoft in their newest versions.

6. **HPC NETWORKING INITIATIVES** - From the four original computer nodes of the ARPANET of 1969, today's Internet connects approximately 60 countries to 25,000 networks while providing volumes of valuable information to millions of users. However, new protocols and services, including enhanced security, are required. These requirements are part of the ARPA program to insure scaling as we look into the future 21st century information infrastructure. ARPA, in conjunction with other Federal Agencies, has demonstrated a variety of new networking technologies in the HPC developed Gigabit testbeds. These range from demonstrations of terrain visualization, interactive radiation medical therapy, heterogenous computing, network control and protocols, and network management, among others. In addition these demonstrations were collaborations among many industrial partners and academic researchers, all focused on the implications of very high performance networking applications.

7. **ARPA SOFTWARE PROGRAM HIGHLIGHTS**

- ARPA's ProtoTech program, which focused on developing languages and tools to support the prototyping and analysis of system components, successfully applied several languages to subsystems of the Aegis cruiser in a "fly-off" experiment conducted by the Navy. The demonstration resulted in significant improvements over codes written in Ada (a five-to-ten times improvement in reduced effort and lines of code).

- The Software Technology for Adaptable, Reliable Systems (STARS) program, which supports the evaluation and transition of technology through demonstration projects that focus on architecture-based design, reuse, and process-driven development methodologies, completed a technology insertion effort with the US Army Picatinny arsenal software support activity (SSA) in the use of the Cleanroom software engineering process. The Cleanroom approach focuses on defect prevention, effectively eliminating costly error removal phases, and produces verifiably correct software parts. This initial transition activity extended the capabilities of the Cleanroom approach, had a 10:1 return on investment for the Picatinny SSA, and has enabled the organization to win additional software maintenance business in army wide competition.

- The Software Engineering Institute (SEI) "matured" and transitioned the Rate Monotonic Analysis (RMA) scheduling approach designed to provide sound engineering bases for ensuring predictable performance of real-time systems. It has had an impact in a number of government and industry programs including the Air Force PAVE PACE program.

8. **WAR BREAKER** - Under ARPA's WAR BREAKER program several accomplishments have been realized over the last year:

- Initiation of the Multisensor Target Recognition System (MUSTRS) flight test program. This involved demonstrations of robust automatic target recognition algorithms coupled with fused infrared and millimeter wave radar sensors.

- Demonstration of the capability of advanced Interferometric (3-D) Synthetic Aperture Radar to support accurate, real-time terrain mapping.

- Completion of the WAR BREAKER Distributed Simulation Experiment--ZEN REGARD--that demonstrated the first-time utilization of distributed simulation representing a joint battlefield as a systems engineering tool.

- Installation and accreditation of the Generic Monitoring System that automatically assesses the status of garrisons.

- The image exploitation system, being developed as part of WAR BREAKER's automated intelligence correlation system, established interim performance of 80% correct identification of deployed ground order of battle units and cut report generation time in half.

9. **OPTOELECTRONICS** - The potential for both military and civilian applications for the following examples of optoelectronic applications and recently realized successes illustrates the dual-use nature of this enabling technology:

- The reliable Vertical Cavity Surface Emitting Laser (VCSEL) technology, with low threshold, high temperature, and high speed operation was demonstrated. The major short term impact is expected to be high speed data communication within electronic system cabinets. In the longer term, the technology will significantly improve the performance of laser printers, displays, and optoelectronic signal processing.

- Successfully demonstrated an 8x8 optical crossbar switch interconnecting computer cluster at the National Security Agency. This optical switch has also been commercialized by Optovision.

10. **X-31** - ARPA's X-31 program, which has demonstrated a unique vectored thrust capability to achieve superior agility over an expanded flight envelope, culminated in the achievement of several "firsts" in aviation history. These "firsts" will underpin the development and operation of future flight vehicles by:

- pioneering flight beyond the stall barrier, demonstrating aggressive maneuvering at angles-of-attack up to 70 degrees;

- demonstrating the rapid post stall turn now know as the "Herbst Maneuver"; and

- successfully integrating an advanced helmet-mounted display to provide enhanced pilot situational awareness.

The military significance of these demonstrated capabilities is a 10-1 exchange ratio in close-in combat against an F-18 fighter.

11. **ENVIRONMENTAL (Critical Proof of Concept)** - Over the years, the DoD has generated millions of pounds of hazardous wastes, the most toxic of which are chemical and biological agents. The destruction of these is a major concern for the Army. I am happy to report that last year an ARPA-sponsored program, in a first-of-a-kind test, demonstrated the destruction of nerve agents GB and VX to greater than 99.99999%. The technology developed, called hydrothermal oxidation, utilizes super critical water and provides for the safe destruction of hazardous wastes in a compact, single stage process with complete containment of effluents. No NO_x or SO_x airborne particulates were generated.

12. **RAPID BATTERY CHARGER** - Last year ARPA demonstrated the charging of a battery for an electric vehicle in less that 18 minutes; the current state-of-the-art for the same battery is eight hours. This demonstration established a new world distance record in a 24-hour period of 831 miles for an electric vehicle.

13. **CMC-RAPTECH** - ARPA's Rapid Preforming Technology for Ceramic Matrix Composites (CMC-RAPTECH) program reduced the time and costs associated with producing prototype and production components from ceramic matrix composites. Using powder preform shapes created by Scanning Laser Sintering (SLS) at the University of Texas, followed by metal infiltration at Lanxide Inc., particulate reinforced metal matrix composites

comparable in performance to mass produced composites have been produced. The SLS process creates a part directly from computer files without part-specific tooling or operator intervention. This has greatly reduced the new product time cycle and cost. Process models and simulation software were developed for injection molding of near-net-shaped ceramic preforms building on preceramic polymer technology developed by Hercules, and ceramic processing technology developed at Lanxide. As a result, Lanxide has licensed the Hercules preceramic polymer technology and will soon be producing commercial products using the technology.

14. **HIGH DEFINITION SYSTEMS** - Recent successes in the High Definition Systems program include the development of a liquid crystal display (LCD) in a 4.4 inch diagonal display for the F-15 Horizon Situation Indicator with nearly 20,000 elements; a six million pixel LCD display; a full color, 19-inch diagonal plasma type panel; a color 4x5-inch electroluminescent panel; and a digital color mirror device with over 2 million moving parts. The plasma display panel was delivered to the Commander in Chief, US Army Europe, for use in the "Victory Bastion" exercise. This was the first operational evaluation of the utility and requirements for a flat panel display in command and control at brigade and battalion levels.

15. **MARITIME SYNTHETIC THEATER OF WAR (MSTOW)** - In the last year we successfully demonstrated a Maritime Synthetic Theater of War (MSTOW). The demonstration integrated a group of undersea models, mockups, and trainers into a full featured Anti-Submarine Warfare (ASW) and mine hunting operation virtually situated in the Sea of Japan. The synthetic exercise was executed over the Defense Simulation Internet, involved participants from Cambridge to Pearl Harbor, and included heavy participation by the Surface Warfare Development Group (SWDG) in Little Creek, Virginia. We now have tangible evidence that real systems can be immersed into distant, denied, or future environments to examine the nuances of specific operational scenarios. The exercise also demonstrated the potential for distributed simulation, not only in training, but in acquisition, doctrine, and system evaluation as well.

16. **INFRARED FOCAL PLANE ARRAYS** - In the last year ARPA has demonstrated three significant accomplishments in the Infrared Focal Plane Array program:

- The reproducibility of 480 x 4 infrared focal plane arrays meeting system requirements for land combat systems, infrared search and track, and airborne target acquisition.

- The first large area (480 x 640) imaging quality, long wave length infrared focal plane array operating at 80 degrees K was produced.

- Established the feasibility of employing larger substrates for producing infrared arrays in both bulk cadmium telluride, increasing the area from 12 cm^2 to 24 cm^2, and in cadmium telluride on silicon (50 cm^2). This has significantly reduced the cost of each array.

SUMMARY

I believe that ARPA's investment strategy and focused research efforts are geared to support the Secretary's stated defense challenges that are based on the changing world security environment and declining defense budget. Central to our investment strategy is a focus on advanced information technology, affordability, dual-use technology research and development, and systems demonstrations. I believe that our focus in these areas, combined with our constant reinforcement of ARPA values, will create the foundations to meet the challenges of the future.

INTERNET INTRUSIONS

Mr. MURTHA. One of the concerns brought to my attention is that we have 2.2 million computers in Internet and as many as 20 million government, industry or private users in a number of countries. Logistics, personnel and finance are all hooked into Internet and DOD has discovered some problems with security. What do you know about that and what do you suggest?

Dr. DENMAN. Certainly the Internet, which incidentally began as an ARPA program in the seventies called ARPANET at that time, has exploded. Usage has doubled every year since inception so it has become a very large network of networks.

The Defense Department uses the network for much of its routine daily business. However, there are no connections to any secure systems, classified computer systems. So protection of national security information is not an issue, but financial and electronic mail are involved. I could not operate without electronic mail.

There was a recent event over the last several months which has been reported. In fact, there were hearings by the Science Committee on this topic where a well-known vulnerability was penetrated. This was not a new vulnerability. It occurred in the academic community because they like to balance openness with privacy and security matters. This vulnerability was penetrated.

If you are logging on from one computer to another and using your password, an intrusion was made to plant some software where it collected all the log-on information and therefore collected the passwords of hundreds, perhaps thousands, of people.

Once your password is exposed, if you do not practice due diligence in protecting your own security as you would with paper, then you are vulnerable.

There is technology to solve this problem. This is offered commercially, a little card you can carry with you, every minute it creates a new password and it is matched to your home computer so every minute you have to put in a new password.

This device will completely negate this kind of a problem. Most of the problem stems from not having good privacy and security practices.

We are continuing to invest in privacy and security technology. At ARPA, we have done something we call——

Mr. LEWIS. Mr. Chairman, could I just ask what is the cost of that service, the password service?

Dr. DENMAN. The initial charge is more than $100, but less than $100 a month.

Mr. LEWIS. Is ARPA making a specific recommendation to the government relative to this security system?

Dr. DENMAN. Yes.

DISA, the Defense Information Systems Agency, is the primary implementer of this governmentwide.

Mr. MURTHA. As I understand it, Carnegie-Mellon has a team?

Dr. DENMAN. Yes.

This is a serious problem. The privacy and security of our networks is an issue that has to be dealt with and we are investing significantly in programs in privacy and security.

Some of those are classified and we would have to go into a different session. But I believe security must begin with due diligence on the part of the user. The problem that occurred recently would not have happened had we practiced proper security procedures.

ARPA established a Computer Emergency Response Team, or CERT, at Carnegie-Mellon that is the clearinghouse of these sorts of problems. They, in turn, establish privacy and security teams across the world and funnel information on how to protect information.

For example, ARPA has what we call a protected gateway. ARPA, to my knowledge, has never been penetrated despite many attempts, even though ARPA Dot Mil is a very well-known address.

We have technology and are trying to get the technology into DISA and other agencies to get it into widespread use.

But the CERT is a key part of the international response to this problem.

Mr. MURTHA. Is it true that intruders actually took over the control of military support and research computers?

Dr. DENMAN. If you are referring to the most recent incidents, "taking control" is an overstatement. They planted software. They collected information and stepped in to read that information.

There have been other instances, some perhaps more serious. We are not involved in every one of those.

DISA has the primary job and they have a special team.

Mr. MURTHA. Were they able to read and did they steal files and install trick software called Trojan Horses into the system?

Dr. DENMAN. Yes, they installed trick software where every time people logged on, it collected their password. The issue is whether they used these passwords to penetrate files of other people, this is still under investigation.

Mr. MURTHA. So you don't know if any files were destroyed?

Dr. DENMAN. No. My sense is quite a bit of the activity, if fact, was hackers that simply enjoyed the fact that they were able to penetrate, but didn't exploit it.

Mr. MURTHA. How serious do you think the problem is?

Dr. DENMAN. Very serious. We have to improve our security and use, better diligence. We are implementing this technology at ARPA even though we have a protected gateway.

If I am in California, I can log on the ARPA through another computer. If I could do that, they could capture my password.

We are working with DISA. We have just established a joint program with DISA to deal with these sorts of problems as well as others.

Mr. MURTHA. Do you have enough money for security in this program?

Dr. DENMAN. I will describe our program today as robust. We are investing nearly a million dollars in technology security. I have just assigned our brightest computer scientist full time to the privacy and security problem.

Mr. MURTHA. Thank you.

Mr. Lewis?

COMPUTER SECURITY

Mr. LEWIS. Thank you, Mr. Chairman.

If at a fundamental level our people, who are now using computer systems for national security purposes, and they are not security conscious, where do you start?

If you don't do that, it is like leaving the door unlocked.

Dr. DENMAN. Part is an education problem. I think the private sector fully realizes the issue. Many are not only using this sort of technology for password control, they are also incrypting their information on the network.

It is a problem that is fully recognized by the sophisticated users on the network. Those that are most lax are the academic communities, who tend to want openness on the system, and I don't know that there is necessarily a major compromise if, in fact, some of their traffic is read.

Mr. LEWIS. Let me focus on questions of national defense.

There is little doubt that the computer is very, very important to our ability to not only communicate with one another, but also to improve high-technology instruments for defense purposes.

It is very important that we maintain security. So let's assume that I am responsible for one of those significant data bases and my password is changing every minute.

If I am using that technology, then all you do is read my new——

Dr. DENMAN. There is a little display here. The number is 676735.

Mr. LEWIS. I enter that and that would be my signature for——

Dr. DENMAN. One minute.

Mr. LEWIS. As long as I am in the data base, will that number keep me there?

Dr. DENMAN. Once you are in, you are in. You have to have a PIN number with this as well.

Mr. LEWIS. Does that change, too?

Dr. DENMAN. No, unless you ask for it to be changed. That is a problem. People aren't changing passwords any more than you change the combination of your safe.

Mr. LEWIS. The fundamental thesis, there is that this technology gives you the capacity to be even more secure than paper secure, but only if you apply mechanisms for security?

Dr. DENMAN. I believe that is true. Yes, sir.

Mr. LEWIS. I heard that from the first time I looked at E mail, and apparently it is a very real problem.

Dr. DENMAN. Industry certainly recognizes this problem and they are not only going to this sort of thinking for password control, they are encrypting their data on the networks using commercial encryption capabilities.

I know DISA has this issue under continuing study and I believe very soon you will see some policies from DISA that will further tighten up our practices.

Mr. LEWIS. Help me with the definition of DISA.

Dr. DENMAN. Defense Information Systems Agency. They are responsible for fundamental policy in this regard.

HIGH DEFINITION DISPLAYS

Mr. LEWIS. The Congress has provided significant add-on funds for ARPA each year to continue development of high-definition displays, which some consider to be key to the future of the Nation's electronic industry.

The budget requests $68 million. What are the goals of the ARPA relative to high-definition display?

Dr. DENMAN. We have been in this business for 3½ years. We spent the first 3 years of the program, the first phase, trying to develop advanced technology. The Japanese today control the marketplace in flat panel displays and one of our concerns is the Defense's inability to get access to tailored products.

In fact, the current policies of the companies that make those displays are that they will not deal with specialized displays for reasons of economics, not for any international political reason.

We feel it is essential that we try to establish a capability in this country. Most of this technology will be on display in town in two weeks. We have the world's most——

Mr. LEWIS. A commercial show or something?

Dr. DENMAN. It is a special show we are putting on and I forget the location.

I can get you the information.

We have developed the world's highest definition liquid crystal displays, six million pixels on a thirteen-inch screen. We have made the world's largest plasma display, about 36 by 36 inches.

We developed a new blue phosphor which is the key enabler for electro-illuminance displays. We are trying to build infrastructure, that is the processing equipment, develop the manufacturing processes and, as you will be hearing from the Department very soon on an innovative strategy, to try to stimulate—through incentives—large-scale production of this capability in the United States.

That will be coming forward in a matter of weeks.

[The information follows:]

A number of demonstrations were held in the Washington D.C. area during the week of 25–29 April 1994. Displays representing recent program successes in the areas of liquid crystal, plasma, electroluminescent, 3–D, and projection displays were demonstrated on April 26, 1994 at the Old Executive Office Building, on April 28 at ARPA, and on April 29 at the Pentagon Office of the Secretary of Defense Conference Center.

The Showcase was sponsored by ARPA to allow Federal executives to experience firsthand the benefits and advantages possible through the use of this advanced technology.

Mr. LEWIS. How will the $68 million be spent?

Dr. DENMAN. Most will be spent on manufacturing processes and infrastructure for tools as well as continuing some of the advance display capability.

About two-thirds will be spent on manufacturing and infrastructure-type activities.

Mr. LEWIS. You mentioned in your testimony low-power electronics which helps to provide an affordable use of microelectronics for defense purposes.

Dr. DENMAN. Yes.

Mr. LEWIS. Is that a cost-savings budget question?

Dr. DENMAN. No. It is in some sense.

Today we have electronics down to the soldier. We need to get that to the soldier at low cost and low cost is the total system.

Part of the system costs are batteries and power you have to carry. We believe we can drop the power consumption by an order of magnitude, perhaps two, so that you can carry around personal computing capability.

Mr. LEWIS. You are talking about an officer in the field——

Dr. DENMAN. Or a private. The Army has a night site and eats batteries like you wouldn't believe. We want to get that battery consumption down to practically nothing. It also is dual use.

Personally portable electronics are a wave of the future.

Mr. LEWIS. That is a wave that is interesting.

The chairman asked the question if you didn't spend the $68 million, but you had $100 million to spend, what would you get for it?

Dr. DENMAN. Obviously there are ideas in the display around that we are unable to fund. We send out competitive announcements and make some very hard choices.

So with additional funds we can explore additional concepts, as well as a more robust manufacturing process development, but I wouldn't start some totally new direction for the program.

COMPUTER SECURITY

Mr. LEWIS. Back to where I started, the question of security and information.

If you let your imagination flow, if you have the average guy in the field with capacity to tap into a data base and he can display with night vision what the field of battle is like, then the security of that information is pretty critical.

I keep asking myself the question what are we doing in a military sense to educate or re-educate people relative to the need for security?

Dr. DENMAN. One aspect of having these events is that it increases the awareness. On the Internet there are several information services that are blasting with the consequences of the recent intrusions. This is one step we are taking to inform the networks.

As I say from a DOD policy perspective, DISA has primary responsibility. We work closely with them in terms of a solution. They are looking at our gateway that we installed. It is experimental, not a production technology.

Unfortunately, to some degree, the supplier industry has the view of trying to sell a car based on safety.

Detroit learned it cannot sell a lot of cars based on safety, just as security doesn't sell a lot of computers. I think the technology is coming. We are investing in a robust privacy and security program, including encryption.

HIGH DEFINITION DISPLAYS

Mr. MURTHA. I have to say, Dr. Denman, that if it weren't for this Committee on high definition displays, the program would be much less robust and would have made much less progress.

The former administration had no interest in it at all and this subcommittee put money in it every year and I think we are beginning to see the results.

Dr. DENMAN. I think you understate. I don't think we would have had a program at all were it not for this committee.

Mr. MURTHA. We have made a difference and we appreciate your interest.

Dr. DENMAN. I think the next step is to try to stimulate our industries to implement and we look forward to working with you on some strategies that are coming forward to do that.

Mr. MURTHA. Mr. Dicks.

Mr. DICKS. Dr. Denman, good to see you again. We appreciate the work you are doing at ARPA. How are things going?

Dr. DENMAN. Well, things are challenging, but it is still an exciting place. We gave your staff a fire-hose job a few days ago. I think he found it still a very exciting place with a lot of very talented people.

COMPUTER AIDED LOGISTICS SUPPORT

Mr. DICKS. CALS Shared Resource Centers—the budget requests $40 million to continue the Congressional initiative to establish CALS Shared Resource Centers. Please explain ARPA's strategy for operation of the CALS Shared Resource Centers. What are the benefits to the government and to local communities in which such centers are located?

Dr. DENMAN. The way I look at the CALS Shared Resource Centers, it is a deployment of the CALS and associated information technology where we need to get this technology in the hands of the small, medium and large-sized firms. I believe the program will focus on deploying a lot of technology to DOD for many years under the CALS umbrella as well as support the larger information technology investments, to enable small companies to come in and take away either software or concepts of how to integrate their operations from tooth to tail, if you will. That is what CALS is about, to computerize the whole enterprise of the interfaces with customers and suppliers, or just to computerize internal support systems.

Mr. DICKS. It is so they can do business with the government or to use in the commercial sector, or both?

Dr. DENMAN. I think both. We have to think in terms of commercial integration from which Defense then can take advantage of that implementation. Many of these companies will be in multiple markets, not just defense companies.

Mr. DICKS. What are the benefits to the local communities in which such centers are located?

Dr. DENMAN. I don't think there is going to be an enormous benefit to local communities. There will be some level of employment to manage the program, but this is an outreach program, reaching beyond the local community into regions; and then we want to interlink the regions to become a national-type network.

Mr. DICKS. How can these centers be made to relate to other ARPA programs?

Dr. DENMAN. I think that will be fairly straightforward. We have a number of programs in information technology, and this is a program I view as one implementation path for our information technology programs. One specific example is called MADE—Manufacturing Automation and Design Engineering. MADE is developing manufacturing-related technologies for enterprise integration. We expect to use the CALS Shared Resource Centers as an implementation outreach program for implementation of some of our ideas. I think that is going to be fairly straightforward.

Mr. DICKS. Discuss the relationship between ARPA, NIST, and the Navy Centers for Excellence in Manufacturing Technology. Is there a relationship between these?

Dr. DENMAN. Yes, and there is also independence. With respect to NIST, we are very tightly coordinating with NIST in its advanced technology program, which has been increased dramatically. Fortunately, the director of NIST is a former ARPA employee, so she certainly understands ARPA. As we have several lunches and opportunities to get together, I am going to understand NIST a lot better. We are making sure that the areas that they focus on are complementary or vice versa with ARPA, and I think that is going well.

With respect to the Navy Centers, this is part of the MANTECH program which I don't manage at ARPA. I have some concerns of how we link into those centers. Some of it is working very well. For example the composite center in Wisconsin is involved in the TRP program, and it is working very well.

We haven't made the connection with the other centers yet, and that is our fault. We are trying to work with the Navy to better connect into those centers. Some of it is working well, and some we have work to do.

UNMANNED AERIAL VEHICLES (UAVS)

Mr. DICKS. One of the programs, ARPA has done a lot of work on is UAVs. We have a new office in DOD on UAVs. Is ARPA still doing its own independent work?

Dr. DENMAN. Well, first of all, the Defense Airborne Reconnaissance Office in the Pentagon is an oversight office, not a program office.

Mr. DICKS. So it is overseeing what is going on?

Dr. DENMAN. That is correct. In fact, they are sending ARPA resources to expand our programs, particularly in high-altitude reconnaissance. I believe a package is on its way here to describe all these programs. ARPA will play a key role as the implementing office, and we are forming a joint office with the Air force and the Navy. The office is pretty well established. We have two colonels in that office, and we will implement the high-altitude UAV program in a joint effort with the Pentagon having the appropriate oversight.

Mr. DICKS. The ——— really ran the national ——— program, acquisition ———.

Dr. DENMAN. Yes. That was an expediency to get something quick. They had some things in a place that could be modified very quickly, and it was a conscious decision that was the best place to move quickly on that particular program.

But the balance of the UAV programs will be run by the Department. I believe you will find the agency taking a point of view as a user, not as a developer.

Mr. DICKS. Is ARPA going to be a developer or one of the developers?

Dr. DENMAN. One of the developers. There is a program under way now called Tier II that is being done in the Navy Joint UAV office. That is a medium-altitude system. I believe that ARPA will run the high-altitude UAVs.

Mr. DICKS. Is that the Tier II Plus?

Dr. DENMAN. Yes, the Tier III minus. That comes from our experience with something called Condor, which we developed several years ago.

Mr. DICKS. I understand that—you may not be briefed on this or maybe you are—that ——— had trouble ———— because of weather and other problems.

Dr. DENMAN. Yes, sir.

Mr. DICKS. Can you tell us about that?

Dr. DENMAN. Let me answer it this way.

Mr. DICKS. There are certain limitations on that technology.

Dr. DENMAN. The important thing we have to get to is to have a radar on-board UAVs so we can see in all weather. The primary payload is radar, not optical. That is where we have to move.

Mr. DICKS. One of the concerns was that, to do the long-endurance system that was maybe the "Cadillac" quality. You couldn't get the redundancy that you wanted.

Dr. DENMAN. Yes.

Mr. DICKS. It is interesting, as we look at each one of these alternatives to the highly capable system, we are finding that there are limitations which were all described and everybody understood, but those limitations come back to haunt you, for example, the weather problems that you have. Do you think we can get a low-cost variant to be able to acquire the kind of intelligence that we need here?

Dr. DENMAN. Yes, sir, I believe that is well within modest risk at worst to get a UAV that can have substantial endurance, and I am being a little fuzzy, I don't want to usurp what is coming over from the Department, and also there are classified numbers here.

Mr. DICKS. We are in a classified hearing, aren't we? Top Secret.

Dr. DENMAN. I believe we can develop such a system for under $10 million that has——

Mr. DICKS. Per copy?

Dr. DENMAN. Per copy, that has all-weather capability. You won't be able——

Mr. DICKS. Day-night?

Dr. DENMAN. Day-night.

Mr. DICKS. Everything?

Dr. DENMAN. The issues come down to how much area——

Mr. DICKS. Stealthy?

Dr. DENMAN. I would rather not answer in this environment, but we are not ignoring the problem of survivability.

But there are issues of, one, how long do you want this thing to fly, where do you want to base it. If you want to base it in the CONUS, very difficult, so we are talking about forward-basing. How much coverage rate? How many square miles per hour do you want to cover with the radar? You could spec that so high that it takes a huge system. We are trying to spec it at meaningful levels and working with the operators. We have close ties with the operators, especially the air combat commands. We are trying to make this affordable, but yet have significant operational utility that will have substantial area coverage rate.

But those kinds of things have to be traded off with cost.

Mr. DICKS. We have never done well with UAVs. Somehow our efforts have been undermined. Are we really going to do it this time?

Dr. DENMAN. You are right. As someone said to me, there are a number of dead bodies on that UAV pile.

The operational community is dedicated to this.

Mr. DICKS. When it gets to the crunch, they never seem to be able to deliver on this.

Dr. DENMAN. Lt. General Jim Fain, who runs the Air Force development side of the aircraft business is enthusiastic about the program, General Loh is enthusiastic about this program.

Mr. DICKS. Is enthusiasm enough for a commitment?

Dr. DENMAN. Let's put it this way. I had a beer with him, and it worked over a beer.

Mr. MURTHA. The time of the gentleman has expired.

Mr. Wilson.

FLOATING BASE/PORTABLE DOCK

Mr. WILSON. Yes, sir, Dr. Denman. In your statement, you didn't mention anything about Mobile Off Shore Bases (MOBs) or about the LSQC. Would you tell us a bit about that?

Dr. DENMAN. Those are two concepts that are under study. We have not launched a development program at this point, but they are very intriguing concepts as we look at forward-basing issues that we face in the world today. We are seriously undertaking doing significant studies, several million dollar level of studies, so this is not just a paper study. There will be preliminary designs that will come from the studies to see what the military utility is going to be of those concepts.

I think cost will be an important issue. To have a mobile forward-basing that is several aircraft carriers in size is not a trivial undertaking either in technology or in cost. We want to understand it a lot better before we become advocates or detractors of the idea.

Mr. WILSON. I believe we have funded it in the last two years, $21 million. Do you see the LSQC as being the one that you will probably move along with the most vigor?

Dr. DENMAN. Probably, but I don't think it is a major tilt. I think that both concepts are intriguing concepts.

We have serious problems with forward-basing. If we could do something here at a reasonable cost, I think that will be the key driver.

Mr. WILSON. Mr. Chairman, do you understand what we are talking about?

Mr. MURTHA. No.

Mr. WILSON. Explain to the Chairman.

Dr. DENMAN. The concepts are to build essentially a floating base for one of the concepts, and frankly, I just went blank on the other one.

Mr. WILSON. That is where you sink a column.

Dr. DENMAN. Essentially, in simple terms, it is a portable dock. You take a ship in that will sink to the bottom and build a causeway to the shore, so you can build a port with a mobile system.

One is a floating base that includes a runway, and the other is essentially a portable dock.

Mr. WILSON. In Mogadishu, it would have enabled a more orderly landing and withdrawal. They wouldn't have have any exposure.

Dr. DENMAN. We want to get far enough in preliminary design so we can do reasonable costing—understand what the costs will be. I think it is feasible. I don't believe it is going to push the edge of technology that hard, but cost is an issue.

Mr. WILSON. You tow them into place. I suppose the ship that you are going to pull into the dock and sink, that one might be self-propelled, but you tow the others. This thing is five times the size of an aircraft carrier, but costs the same——

Dr. DENMAN. It is essentially barge technology coming off of the oil industry, and that sort of thing. That is where the idea will come from.

The other is a self-propelled concept, not all that large, and the amount to ballast and deballast a ship is not all that difficult. We have done it before.

Mr. WILSON. Is the idea when you leave, you can float the ship——

Dr. DENMAN. Sure. All you need is air compressors to refloat the ship.

Mr. WILSON. Bring a ship in and sink it and have a causeway across, and everybody uses it—we would put that 100, 200 miles offshore?

Dr. DENMAN. It would depend on what your perceived threat is. I think the maximum extent would be 100 miles or 200 miles, that range. You might put it at 25 miles.

Mr. WILSON. Sometime I will bring the models in, Mr. Chairman. They are very interesting.

Dr. DENMAN. Anyway, I think we are about a year away from being able to provide the answers to your question.

Mr. WILSON. I understand from talking to your people, that with the $20 million you have, you will likely this year build a couple of sections of the causeway.

Dr. DENMAN. Yes, we will be doing key experiments to make sure we understand the technology. The important thing is to come up with preliminary designs in enough detail that we can cost out the system. That is what the committee would want us to be able to answer.

Mr. WILSON. Thank you, Mr. Chairman.

Mr. MURTHA. Mr. Skeen.

SINGLE STAGE ROCKET TECHNOLOGY

Mr. SKEEN. Thank you, Mr. Chairman.

Doctor, good to have you here. Would you give me an update on the developments that ARPA is involved in on phase two of the single-stage rocket technology and the SSTO system?

Dr. DENMAN. As you are probably aware, the ARPA budget for SSTO in fiscal year 1994 was a congressional plus-up. We have not been in the large-launch vehicle business at ARPA for some time.

We certainly have been in the small-launch vehicle business with Pegasus and Taurus. We just successfully launched Taurus for the first time, a total success of a very rapid, deployable launch capability.

As you know, this issue goes beyond technology. This issue goes beyond a national launch vehicle strategy, which has been under study by General Tom Moorman at the behest of Mr. Deutch to put a story together that would be a DOD position, NASA and other agencies participated on this study.

I was on the steering committee for the study. The results are just coming out now. I believe Mr. Deutch was briefed and I don't know what direction has been given to General Moorman, but the results of the study will be available very shortly to the committee.

ARPA is not executing a technology program until we have the benefit of the full results of that study. So we are in a wait mode.

Mr. SKEEN. So you are in process of determining where you are going to go, based on the report?

Dr. DENMAN. That is correct. The largest concern is whether the country can afford the development of such a vehicle. It is a very expensive proposition.

Mr. SKEEN. So there will be a great deal of cost analysis?

Dr. DENMAN. There has been a great deal of cost analysis.

ADVANCED SHORT TAKE-OFF AND VERTICAL LANDING (ASTOVL)

Mr. SKEEN. The ASTOVL, that is very interesting. You are talking about replacing three aircraft types.

Dr. DENMAN. I mentioned it in my opening comments.

Mr. SKEEN. I would like to have some idea of that is the strategy, how far are we in the development and what is the cost?

Dr. DENMAN. Well, I certainly don't want to oversell, but I think it is a very intriguing concept that, in fact, we could finally get to a truly interoperable airframe with the Navy and the Air Force, service-wide, Navy, Air Force, Marine Corps could use the air frame. We believe this is possible, because the vertical landing capability allows the Navy to use the system in the same way—that is, soft-land on a carrier, so that you do not have to carry around the weight penalty of a hard carrier landing, beefed up landing gear.

For the Air Force—the concept uses a vertical lift fan so you have the main engine powered off of that as a fan that gives you additional vertical thrust for the Navy applications. You take out the fan and put in fuel for the Air Force.

Mr. SKEEN. So you just replace the module as far as the Air Force is concerned?

Dr. DENMAN. Yes. We are doing experiments to reduce risk and a decision will be made in fiscal year 1996 whether to proceed with a technology demonstrator. We are in the risk-reduction phase, doing detailed designs with Lockheed, McDonnell Douglas, and recently we have put Boeing under contract.

Mr. SKEEN. You have no prototypes?

Dr. DENMAN. No, we haven't even committed to build the prototypes. That will be a competitive process.

We will also do that only jointly with the gentleman's initiative. I am optimistic that the program will go forward, but there is no decision as yet.

What will allow us to do it is the improvement in technology in engines.

AV–8B AIRCRAFT

Mr. SKEEN. I have flown the AV–8B. The only thing you have to bring is fuel and ammunition; it makes its own oxygen.

Dr. DENMAN. That is correct. This concept will have the up and away performance of an F–18.

Mr. SKEEN. You have to if you are going to make——

Dr. DENMAN. We have the engines that will allow us to get the vertical lift without extreme penalty.

Mr. MURTHA. Mr. Hefner.

Mr. HEFNER. No questions.

Mr. MURTHA. Mr. Visclosky.

BUDGET REQUEST

Mr. VISCLOSKY. Thank you, Mr. Chairman.

Could you tell me what ARPA's total budget is for 1994 and what the request is for 1995?

Dr. DENMAN. For 1994, we requested $2.5 billion. For 1995 we are requesting $2.6. We were appropriated about 2.8 in 1994.

Mr. VISCLOSKY. So essentially your request is $200 million below the 1994 level?

Dr. DENMAN. That is correct, but it is also 100 million above the 1994 request.

RESTRICTIONS BY CONGRESS

Mr. VISCLOSKY. At the end of your remarks, you made an interesting statement that about 70 percent of the programs that you have authority for—and I assume that is included in the 2.8—are restricted by Congress, and that we should at least have that on our screen. Would you elaborate, please?

Dr. DENMAN. There are three restrictions. One which is called fencing. This is where Congress makes it a special-interest item and, therefore, we are restricted from any reprogramming of those dollars to move to other opportunities.

Second, there is a special provision in the appropriations report that requires us to consult with Congress on other parts of our program that are not special-interest items before we move any money. So we have to write over to the Congress to change any budget for all but 30 percent of our program.

The third category, of course, is specific earmarks. But the larger of the two are the fences and this special provision where I am required to request any change in budget for several of my programs elements.

Mr. VISCLOSKY. On reprograms, wouldn't you need to come in for reprogramming anyway?

Dr. DENMAN. Congress gives reprogramming latitudes, I believe $4 million in any given reprogramming element. So I am talking about small sums of money that we would normally be allowed to reprogram within this $4 million threshold that I am restricted from doing by special provisions in the appropriations bill.

Mr. VISCLOSKY. Otherwise, you would, under normal course, if you so choose?

Dr. DENMAN. If it is larger than $4 million, of course, we have to come back to the Congress.

Mr. VISCLOSKY. Recognizing that you have very specific congressional interests in many of these items, does that interest accrue after a research program begins, or are many of these initiated because of a congressional request?

I understand the politics. I wonder about the mechanics of which comes first here.

Dr. DENMAN. Most are within our budget; therefore, they were defined and identified by ARPA and then received special attention in the Congress or special constituency or whatever that caused a fence to be put on the program.

For the most part, we have had very good support from the Congress, so I am not here to register my displeasure to the Congress. But I do think you look to ARPA to have reasonable flexibility to pick up on a new idea with modest changes in budget and move forward.

Perhaps the most troubling one is the restriction that is only applied to ARPA, is not applied to other agencies where I have to come back on three of my program elements before I can change anything. I am not sure that that is in the best interest——

Mr. VISCLOSKY. You are talking about the $4 million reprogramming——

Dr. DENMAN. No, about the special language that applies only to ARPA that for three of my program elements I must come back to Congress to request any change before I reprogram or even change projects. If I am just changing between projects, it is not a reprogramming action, but I can't even change between projects without coming back.

Mr. VISCLOSKY. Is that the fencing?

Dr. DENMAN. Fencing is normal. Beyond that in the appropriations report there is special restricting language that applies only to ARPA where I cannot change anything in three of my six program elements without coming back to Congress; and I find that overly burdensome.

Mr. VISCLOSKY. Looking to 1995 and your responsibility for the program and new initiatives and the direction, do you have a sense that there is something that might be undone that would be worth pursuing, that if some modest adjustments could be made, you could pursue X?

Dr. DENMAN. I would hope that this special restrictive language that only applies to ARPA would not be put into the 1995 report.

I understand special-interest areas. That is—I understand earmarking, but these special restrictions put on ARPA I think are counterproductive.

ELECTRONICS TECHNOLOGY

Mr. VISCLOSKY. In the area of semiconductors and computers, one of the interesting things that I noted when I visited the shipyards in Rhode Island, Connecticut, on the attack submarines or the Seawolf, that the technology for those weapons evolved, but the electronics just change all of the time, that they are always changing.

What is ARPA's real role if the movement in the electronics industry is just so ferocious, and that is my impression of it, both from the visit to the shipyard and general observation—what is our real role there if industry is out there every day?

Dr. DENMAN. ARPA, as we like to say, we must stay on the curve, stay with the electronic technology. That is ARPA's bread and butter.

The challenge is to convert that technology into military capability not two or three or four generations after the fact, but perhaps one or two at the most. I think that is part of dual use strategy where we are taking high-performance computing, and designing and developing a prototype for embedded computers for ships and aircraft.

So I think ARPA and the overall science and technology community need to take the work further so that the risk is reduced for the Navy to make a commitment to put a new computer on a ship, and we are committed to trying to do that. We have sizable programs in what we call "embedded computing," embedded into a weapons system.

Mr. VISCLOSKY. So you would see your role in that area not so much as assisting the industry, but taking what is rapidly changing in that industry and making it adaptable?

Dr. DENMAN. Exploiting it.

We are also part of the development, but in that case, you might view us as part of the problem. We are helping move the technology faster, but we need to focus on exploiting the technology. That is a significant part of our program.

Mr. VISCLOSKY. There is a question for the record I will not ask on the advance submarine technology program. That will be answered for the record.

ELECTRIC AND GAS VEHICLES

Another program, electric and gas vehicles, in your opening statement, you talk about the paramount role for ARPA is to be an agent of fundamental change; and looking at the impact on defense as well as the Nation.

Last year, Congress provided $46 million for electric vehicles, $15 million for natural gas. Apparently, there were no funds requested for 1995 to continue the programs.

Two questions: One, what will be done with the $16 million or parts thereof.

Secondly, why not a request for additional funding?

Dr. DENMAN. If you would let me answer the second one first——

Mr. VISCLOSKY. Sure.

Dr. DENMAN [continuing]. We fully expect that, in fact, there will be activities in vehicle technology within the technology reinvestment project. This is the large part of defense conversion.

Last year, we had—I have forgotten the number—$15 or $20 million in the technology reinvestment product on electric vehicles, and I would fully expect to continue that. Although we haven't made the final selection of areas, I believe it will receive priority.

So we don't expect it to be zero.

We didn't request separate funds for the program. Also, these programs, because we did not request the money, it takes us longer to execute the program. We were not prepared to execute these programs. We have to do competitive selections on the programs and that takes time.

Mr. VISCLOSKY. So your appropriation was an add-on?

Dr. DENMAN. Yes. In terms of what we are going to do with it, on gas, we will use 50 percent to do demonstrations at various military bases, so that we can really get the database to understand the payoff of natural gas conversions of gasoline vehicles.

The other part, we will put into research on improving the capability of natural gas vehicles.

On electric vehicles, the money is earmarked to go to various regions of the country to have regional coalitions develop the technology. We are trying to make this a national program so that we don't have competition among regions of the country, and we have divided it into five technology areas on controllers and power. We are not doing any major battery work, because the DOE and the U.S. battery consortium is doing that.

We will be doing demonstrations of capability. My interest lies in moving towards more electric vehicles, aircraft or tanks. It will first appear in light vehicles, and that is our interest.

As you look at the electrification of the battlefield, if you will, we need to have systems that are more flexibile. Today, in order to run the electronics of an M–1 tank, you must run the 1,500-horsepower engine just to run the electronics of the tank.

Mr. VISCLOSKY. One final questions.

We talked abut add-ons and we tend to talk about add-ons in all the programs we are dealing with. Did ARPA discontinue research last year because you didn't feel they were going to be fruitful and the dollars could be spent elsewhere. My concern is that in a lot of situations, programs take on a life of their own. Can you point to one that ARPA said we are better off spending this money someplace else next year?

Dr. DENMAN. I am having trouble coming up with a specific example.

Mr. VISCLOSKY. If you care to answer—take fiscal year 1993, for example, and provide that for the record.

Dr. DENMAN. The hardest thing to do in the government is to get out of something. I believe ARPA does that pretty well. I must have gotten out of things, because I believe there are at least a dozen program managers that are angry with me.

[The information follows:]

1. Aladdin. Transitioned to Army and Navy. Developed a modular, miniaturized high performance computer for space and weight constrained environment such as smart weapons, advanced air to air missiles, or high performance aircraft.
2. X–ROD. Transitioned to Army. X–ROD was a BTI funded, ARPA managed, program to develop a terminally guided round of tank ammunition.
3. Armor/Anti-Armor. Completed. Provided "leap ahead" technologies to advanced systems for protection of US soldiers. Produced several products, most notably LAST armor, currently being implemented on Marine Corps vehicles, and new shaped charges.
4. High Power Microwave Program. Completed. Determined whether microwave beams, both pulsed and modulated, could be used to damage/interrupt the operation of battlefield electronics systems.

5. Digital Gallium Arsenide (GaAs) Pilot Lines. Completed. Demonstrated the feasibility of manufacturing digital GaAs circuits of large scale integration (LSI) complexity in the metal semiconductor field effect transistor (MESFET) technology by applying silicon manufacturing principles to this compound semiconductor.

6. Digital GaAs Insertion Program. Completed. Established initial prototypes of signal processing subsystems where silicon implementations were replaced by GaAs ICs to either achieve greater operating speed (signal processing throughput), a reduction in subsystem complexity (IC count), or subsystem power.

7. Ultra-sensitive Seismic Array Development. Transitioned to the Air Force. This project involved the development of sensors, electronics and site installation techniques for detection of small nuclear explosions. The technology has been adopted as the standard for the international monitoring system for the Comprehensive Test Ban Treaty.

8. Mine Search System (MSS). Transitioned to the Navy the Unmanned Underwater Vehicle (UUV) system for minefield survey and avoidance.

9. Advanced Tactical Array. Canceled. Multi-sensor optical array deployable from a UUV. Program canceled in FY 1993 since the Navy is planning a similar program.

10. Advanced Vibration Reducer (AVR). Transitioned to the Navy. Increases submarine stealth by reducing propulsion related noise.

11. Structural Acoustics Workbench. Canceled. Provided computer aided, integrated design environment for development of active structural control of applications. Program canceled due to funding constraints.

12. Active Impedance Modification (AIM) Program. Canceled. Classified Structural Acoustics Program canceled due to funding constraints.

13. Project I. Transitioned to the Navy. Development of full-scale intrastructural actuation technology for submarine stealth.

14. Project S. Transitioned to the Navy. Structural acoustic numerical modeling development and validation.

15. Non Penetrating Periscope. Transitioned to the Navy. Submarine periscope that uses high resolution video imaging cameras and fiber-optic cable transmission paths instead of the traditional optical path, permitting great flexibility.

16. Advanced Nickel-Cadmium (NiCd) Battery. Transitioned to the Navy. An advanced submarine battery that could lead to reduced size and weight compared to present lead acid designs.

17. Hydrodynamic/Hydroacoustic Technology Center. Transitioned to the Navy. An innovatice computational center for advancing hydrodynamic capabilities.

18. Axial Flow Shaftless Pump. Transitioned to the Navy. Innovative prototype pump which exhibited very good noise and flow characteristics during testing.

19. Adaptive Focused Beamformer (AFB). Completed. Applied advanced adaptive signal processing algorithms to solve the problem of long-range submarine detection in a complex, high noise environment. Real-time application of these algorithms required use of a massively parallel, high performance computer developed under the ARPA Touchstone Program.

20. Decision Support System (DSS). Completed. Prototyped an integrated platform for decision support addressing sensor deployment and operation and force distributions to maximize the performance of U.S. Low Frequency Active Acoustics (LFAA) systems.

21. Active Signal Processing System (ASPS). Completed. The ASPS is a bistatic active acoustic processing system which performs real-time signal, information, and display processing of complex waveform channels. ASPS successfully demonstrated the benefits of real-time processing of advanced waveforms for active ASW.

22. Autonomous Multistatic Active/Passive Processing System (AMAPPS). Transitioned to the Navy. AMAPPS developed and demonstrated an automated multistatic active/passive acoustic processing capability for airborne prosecution of a submerged target using a sonobuoy field. The technology, originally designed for deep ocean environments, was adapted to the shallow water environment as the military focus changed.

23. The Strategic Computing Program. Completed. Follow on efforts are building upon the program's successes in computing and communications by developing High Performance Computing and Communications (HPCC) technologies.

Mr. DARDEN. I have a couple of things I need to talk to the gentleman about. I don't need the record, so I will pass and meet him when we get through here.

DIRECT LIFT TECHNOLOGIES

Mr. DICKS. One question. In last year's defense appropriation bill, Congress provided $6 million for direct lift technologies for the ASTOVL program. This is the advanced short takeoff and vertical landing. I have worked hard to get these funds released, and I understand you have reached an agreement with industry on this program.

As I understand the agreement, the program requires $32 million. Industry will cost-share the research for this direct lift program with ARPA, so now that the $6 million is released, this leaves $20 million to be divided, yet there is no requested funding in the fiscal year 1995 budget request for this ARPA program. How do you plan to fund this research this year?

Dr. DENMAN. Well, first of all, of course, this is one of three programs and three contractors. When we had the original competition, the Boeing concept fell out. Therefore, we didn't budget for the Boeing concept.

Of course, through the congressional action in 1994, there was money added to Boeing, which was tracking us on a non-cost contract prior to that. Unfortunately, we have not budgeted for continuation of the Boeing activity. We have established some milestones so that we will get specific products for the $6 million investment, but we, in fact, felt that our investment plan for the ASTOVL was at the level that we could afford to invest. Fortunately, we have not added additional money. So the funding for that Boeing work would come to an end in about a year.

Mr. DICKS. If Congress chose to do what it did last year, how much would be needed in the budget to keep this thing going?

Dr. DENMAN. I am not sure. I will have to answer that for the record.

[The information follows:]

When we contracted with Boeing to perform the Direct Lift research funded by Congress in FY94, we included an option which if funded would put the Boeing research on a par with the other two contractors working on ASTOVL critical technology validation. The funding required to complete this optional effort is $10.4 million in fiscal year 1995 plus $0.9 million in fiscal year 1996.

Mr. MURTHA. Thank you, Dr. Denman.

Mr. DICKS. I have questions for the record.

Mr. MURTHA. Without objection, Mr. Dicks has some questions for the record.

[CLERK'S NOTE.—Questions submitted by Mr. Dicks and the answers thereto follow:]

ADVANCED SHORT TAKE OFF VERTICAL LANDING (ASTOVL)

Question. In last year's Defense Appropriations Bill, the Congress provided $6 million for direct lift technologies for this program. I have been working very hard all year to finally get these funds released from the Pentagon, and I was especially pleased to learn of ARPA's research agreement with Boeing on this program.

As I understand the agreement, the program requires $32 million. Industry will cost share the research for this program with ARPA. So now that the $6 million is released, this leaves $20 million to be divided. Yet there was no request in funding in the FY 1995 Defense Budget request for this ARPA program.

How much do you plan to fund this research this year?

How much will ARPA need this year to keep this research program on track?

Answer. The results from the competition for the current ASTOVL technology validation phase ranked the Boeing proposal behind two other proposals and funds were not available to fund a third program. This situation continues to exist and no funds are budgeted in FY95 nor baselined in our five year plan. The recent Boeing Agreement has an optional phase that would require an additional $11.3 million to fully fund.

EXPORT OPPORTUNITIES

Question. As you administer the programs under the Agency intended to promote development of dual-use technologies, what attention is given to technologies that have particular potential for important substitution and/or high export potential?

Answer. Our concept of dual-use depends on the fact that a technology is viable in both defense and commercial products allowing for both continued access by the DoD and lower prices due to commercial markets and competition. A specific criterion for selection was the extent to which there was potential for commercial markets of all kinds for dual-use technologies. There was no special bias toward foreign markets over domestic markets but proposals were discouraged which were likely to result in the creation or migration of jobs offshore.

Question. As you coordinate your programs with the Department of Commerce and other government agencies involved in the Trade Promotion Coordinating Council, what are you doing to assure that dual-use technologies funded by ARPA are being provided with appropriate marketing assistance to take advantage of emerging world markets?

Answer. Because the TRP emphasizes precompetitive technologies in its Development projects, explicit activities in marketing, either foreign or domestic, are not normally included. However, marketing-related activities are addressed in two other ways. First, through the Deployment projects where some kinds of specific marketing information is provided. Second, because the Department of Commerce is on the TRP team, the full array of foreign and domestic market services will be made available to participants.

Question. In your professional view, are there additional steps that may be appropriate, and which may require legislation that can better integrate TRP, MANTECH, and other programs you administer into efforts to compete in the global market?

Answer. Many firms, especially small and medium-sized firms, have indicated that they are reluctant to pursue off-shore markets for products that might contain dual-use technologies on the grounds that they will be liable to prosecution under export control regulations which seek to impede the flow of military and dual-use technologies off-shore. A review and clarification of these statutes might alleviate some of this anxiety.

ADVANCED LITHOGRAPHY

Question. It is my understanding that the principal reason the funding level for Advanced Lithography in ARPA's FY 1995 was reduced from historical levels of $75 million to $10 million was the lack of industry agreement about the program. In light of the critical nature of lithography and the recent consensus that has emerged from the US industry, will ARPA attempt to restore the long-term R&D funding levels for the lithography program to the historically higher levels?

What can ARPA accomplish in this area of research with only $10 million this year?

Answer. ARPA reduced its funding request for advanced lithography from $46.6 million in FY94 to $10 million in FY95 because the US state-of-the-art lithography manufacturing tool industry was disappearing. Specifically, General Signal closed its GCA subsidiary, and SVGL began negotiating a joint manufacturing agreement with the Japanese firm Canon in order to stay in business. There clearly exists a concern over spending tax dollars on development programs that may not benefit a US manufacturer of such equipment.

Lithography tools are indeed of vital importance to the US semiconductor industry. Of primary importance are the production steppers. ARPA is encouraged by the US semiconductor industries efforts, primarily through the Semiconductor Industries Association (SIA), to promulgate the development of a unified US position on lithography which both the users and the tool developers endorse. When a position emerges that shows how the industry intends to assure that technical superiority in the lithography area also translates to commercial viability, ARPA will attempt to restore its support to the historically higher levels.

Wuth the $10 million in FY95 funds ARPA will try to maintain the various approaches to advanced lithography, concentrating on just the most critical issues.

[CLERK'S NOTE.—End of questions submitted by Mr. Dicks.]

Mr. MURTHA. Thank you, Dr. Denman. There will be additional questions for the record.

The Committee is adjourned until 2:45 p.m. this afternoon.

[CLERK'S NOTE.—Questions submitted by Mr. Sabo and the answers thereto follow:]

HIGH PERFORMANCE COMPUTING INITIATIVE

Question. I understand the budget request would increase High Performance Computing research from $289.9 million in FY94 to $357.9 million in FY95. Last year, Congress reduced requested funding by about $50 million, in part because it appeared you had a very significant increase from the year before. Now I have been told that may not have been the case and that the perceived increase was not real, but resulted from program reorganization. Can you tell me, first, whether your FY94 request actually represented a reorganized program and, second whether the cut in your budget caused any disruption in the program?

Answer. I believe there were some misunderstandings in the budgeting process during FY94, and we have taken extra steps to ensure your staff is familiar with all the budget details. Between FY93 and FY94, several projects were moved into ST–19, High Performance Computing, to consolidate efforts and to provide more consistent visibility into this important project. Overall, this represented about an $8 million decrease in direct funding to the High Performance Computing (HPC) effort. Funding in FY93 included both ST–19 (High Performance Computing) and ST–10 (Strategic Computing). In FY94 ST–10 ended and a portion of the monies were transferred into ST–19. It thus appeared that there was a large increase from FY93 to FY94 in ST–19.

The $42 million cut in FY94 required severe and major adjustments in the program. Simply stated, the cut forced us to completely defer plans for early evaluation work; delay our ability to seek new ideas in scalable systems by almost nine months; and defer plans for additional collaborations between agencies which would have created additional network and systems testbeds.

Question. What is the focus of the work you are planning for FY95?

Answer. As part of the Federal HPCC program, ARPA's request for FY95 was $357.9M, up from $298.9M in FY94. There are several projects in ARPA's budget which contribute to the Federal program and which become the basis for the Federal HPCC budget request. The FY95 funds ($243.7M) requested under the High Performance Computing Project (ST–19) will continue to develop the software and hardware technologies leading to a scalable computing and communications technology base for systems configured over a wide performance range for both the Defense and the Federal sector. There are several initiatives in the FY95 request which I'd like to bring to your attention:

First, a major increase is planned to support the explosion in opportunities for Information Infrastructure. The HPCC program's research investments in advanced computing and networking technologies lay the foundation for this critical national-scale enterprise. Under the HPCC program's new Information Infrastructure Technology and Applications (IITA) program component, we are developing a layered architecture for the Information Infrastructure that will ensure high leverage through a common set of end-user and applications-developer services that bridge the network "bitways" and applications. This, of course, is being done in conjunction with industry, academia, and other Agencies.

Second, we plan to increase the software technology investment and, in collaboration with other Agency efforts, meet the critical need for technology to enable applications on a variety of platforms. A series of collaborative pilot projects will be established aimed at unifying compiler technology, run time systems, and support for scalable input/output. Software has always been an integral part of the ARPA HPCC program, and we currently estimate that approximately 55% of the FY94 program of the High Performance Computing project is software related.

Third, we plan to increase investments in critical areas of scalable systems. An important variant of scalable systems, called embeddable systems, will receive increased funding in FY95. Embeddable systems are those that are packaged to withstand harsh environments that may be found in typical military applications, such as on-board unmanned air vehicles (UAVs). Embeddable systems will use the same software as used in the commercial variants, thus reducing the cost of developing these systems. In addition, the early evaluation component will be reinstated, to ensure the earliest possible feedback between the industry and users of new systems. While continuing to push high performance computing development for scientific and defense applications, alternate scalable configurations will include high performance servers, clusters of workstations, or networks with many vendor's computers. We plan to add important new capabilities to families of computing systems such as real time response, and scalable input/output to meet the needs of the systems users.

Fourth, the networking world must be prepared for a balanced environment of information security, high performance, and advanced services. We plan to increase investments in network scaling issues, information security, and couple these efforts to our IITA component.

Fifth, we plan to apply HPCC to design technology and its experimental applications to computing. As computing systems become increasingly complex, there is a cost, time, and scientific benefit to prototyping the system in software, rather than the use of traditional experimental prototyping methods.

Question. How have you responded to criticism that ARPA's high performance computing program focused too heavily on hardware, at the expense of usable software programs?

Answer. I believe a contributing factor to this criticism was a misunderstanding of the program and ARPA's role as part of the Federal program. It is important to look across the HPCC program, since each Federal participant is responsible for different portions of the program. Roles and responsibilities are described in detail in the budget supplements produced by the National Coordination Office (NCO). ARPA has taken the lead in developing scalable systems (both hardware and software) that are being used in several of the applications and by other HPCC participants. ARPA also has a major role in developing the high performance networking technology, and the advanced part of the information infrastructure described in the previous question. We have taken several proactive steps to eliminate this misunderstanding, including additional briefings to Congressional staff; a public 3 day ARPA HPCC Symposium; the publication of the Federal HPCC Implementation Plan; and making certain project information available on line.

Software has always been an essential part of the entire program, and we currently estimate that approximately 55% of the FY94 program in the High Performance Computing Project is software related. Our program has a balanced approach and we are responding to more effort in that area, as described in the preceding question.

Question. Please provide more information about the "embeddable systems" you mention in your record. In particular, please give us some examples of ways we can use this technology in actual military weapons systems.

Answer. The Embeddable High Performance Computing effort is focused directly at providing a technology bridge from commercial-off-the-shelf (COTS) scalable computing technology to embedded system application areas including military systems. One goal of the program is to demonstrate an embedded version of a commercial HPC running the same software within six months of first commercial release.

These investments will create deployable prototype computing systems for insertion experiments, real time operating system development, parallel algorithm demonstration, benchmarking, and embedded-specific physical technology development. The Embeddable Computing effort will work directly with DoD Labs, military organizations, and military systems contractors to ensure that enabling technology is directly relevant to military missions and is ready for insertion in a timely and cost effective manner.

Candidate HPC architectures will be selected on an open competitive process based on the technical strength of their proposed efforts and relevance to specific military requirements. Early demonstrations of HPC technology have been completed with AEGIS and evaluations of HPC systems are ongoing with THAAD. Discussions are underway with JSTARS, War Breaker, TIER II+, and MCARM.

Question. How much do you intend to spend on these embeddable systems in FY95?

Answer. Our request is for $13M in FY95.

Question. Last year, both the House Armed Services Committee and the House Appropriations Committee expressed serious concern about way the Department of Defense was spending money designed for modernization of DoD high performance computing capability. In the end, we adopted legislative language restricting the way those funds could be allocated.

I have recently been briefed on changes the Department has made in the High Performance Computing Modernization (HPCM) Program, and I am pleased to say those changes appear to be very positive. The Department has reduced the emphasis on the procurement of experimental machines and focused the program on providing DoD researchers with the most advanced computers available.

With these changes, the HPCM has become more of a normal acquisition program, and less an adjunct to the High Performance Computing and Communications Initiative, which fundamentally is a research program. I understand that ARPA's role has been redefined to that of an advisor to the procurement program. I believe this is appropriate. Since the HPCM is focusing on procurement of operational machines, does ARPA intend to change the HPCCI to make up for reduced research spending from the modernization program?

Answer. As you note, the modernization program was never intended to be a research program, but a program to "modernize" the DoD laboratory system. ARPA and representatives of the Office of the Director, Defense Research and Engineering (DDR&E) have worked hard to insure there is a clear understanding between these programs to avoid possible misinterpretation. The laboratories, however, become important DoD customers of results emerging from the High Performance Computing and Communications Programs, and all of our programs will continue to work toward rapid technology transfer.

Independent of the modernization program, cuts that were levied against ST–19, High Performance Computing, forced any early evaluation work to be postponed. Our FY95 request includes additional work in early evaluation, and we believe this is important to continue.

Question. I understand from recent press reports that one of the newest supercomputers purchased by the federal government, the Intel Paragon, is not working as advertised. Users report very high levels of unscheduled downtime, difficulty of use, and other problems. I believe ARPA was involved in encouraging purchase of this machine. Have you monitored its performance, and how do you respond to reports the system is not ready for operation use?

Answer. ARPA was not involved in the decisions to purchase the cited machine, and will not influence the decision processes involving procurement of commercial HPC systems by others. The responsibility for determining whether a machine is "operational" or not rests with the user and his needs. It is, however, our purpose to fund the very best competitively selected R&D of underlying technology in both hardware and software leading to successful commercial systems serving a broad class of dual-use markets.

We have a cost shared agreement with Intel for research in scalable computing, and have closely monitored progress of Intel's multicomputer family. While we certainly take issue with specific statements made recently in the press, there are some legitimate concerns with the existing commercial version of the Paragon. These have been known for some time, and we have been working with Intel to define, prioritize, and develop a plan for resolving them. Intel is taking very aggressive steps to resolve them rapidly. We believe their proactive response is exactly what is needed in any new system.

Finally, it is sometimes difficult to get a balanced perspective only from the weekly press reports. Many important problems are just beginning to be solved on today's scalable parallel machines across many industries, and users are reporting exceptional results as well. The Oak Ridge National Labs recently accepted a 512-node Paragon after passing a seven-day acceptance test of its stability and performance. Paragons are also at several other locations, which are producing important results.

Question. In general, does ARPA monitor the performance of high performance computers that it has either purchased or encouraged other users to purchase? If so, what does your work indicate about the maturity of these systems?

Answer. ARPA, in general, is very much involved in keeping abreast of the performance of HPC systems and encourages contractors and principal investigators to publish results of their work. In addition, we work directly with other Federal Agencies who produce benchmark results which are widely distributed. However, benchmarking itself has certain limitations, particularly when new capabilities are being introduced into new systems. This, of course, is the reason to have a strong early evaluation component in the R&D program.

From an operational point of view, these systems are maturing rapidly and there are many systems in "operational" environments today. In addition, important applications are being run in the oil industry, medical, automobile, and financial industries. However, aggressive new capabilities always have some risk. It is in our interest to insure we have a process established to rapidly resolve and debug problems. In this way, new ideas and capabilities transition more rapidly. Ultimately, the marketplace will determine the "maturity."

LITHOGRAPHY

Question. Dr. Denman, I notice in your testimony you mention that lithography is one of "the most critical components of semiconductor manufacturing lines in terms of achieved desired competitive product capabilities." For several years this Subcommittee has been adding money to the budget for lithography research. We understand that advanced lithography is essential for advanced semiconductors, and semiconductors are essential to every modern electronic system and component.

Yet now ARPA has proposed cutting lithography research from $60 million last year to only $10 million in FY95. You state in your testimony that this is because of a "unstable industry status." This status to which you refer is that only one major American manufacturer remains to compete with two major Japanese firms. It appears to me that this "instability" actually provides you with a reason for increasing lithography research, not for cutting it. Do you think the United States would benefit if American firms gained a greater share in leading-edge lithography systems? Would an increase in the ARPA lithography R&D budget help achieve that goal?

[CLERK'S NOTE.—The Department was unable to provide a response in time to be printed in this hearing volume.]

Question. How many research projects are you funding with FY93 and FY94 lithography research money? What happens to those projects if you cut funding to $10 million?

[CLERK'S NOTE.—The Department was unable to provide a response in time to be printed in this hearing volume.]

Question. Could ARPA productively utilize additional funds in this area?

[CLERK'S NOTE.—The Department was unable to provide a response in time to be printed in this hearing volume.]

COUNTERPROLIFERATION PROGRAM

Question. ARPA apparently is planning to increase research on technologies that will help control the spread of nuclear weapons. You mention this program in your testimony, but do not provide much detail. Please provide the Subcommittee with detailed information about the counterproliferation program, including the goals, schedule, annual and total costs, and potential contribution to the nation's arms control objectives for each project and task.

Answer. The goal is to develop new technologies to support the earliest possible detection and monitoring, and interdiction of the proliferation of nuclear, chemical, biological, and advanced conventional weapons and to explore interdiction options. The project will develop and provide early demonstration of advanced sensors, information processing, modeling, command and control methods, and response option technologies. The requested funding for this program in FY95 is $25.5 million.

The proliferation detection and monitoring technologies to be developed include: point and remote detection of nuclear, chemical and biological production, deployment, and wartime use activities. This encompasses high resolution sensors with high selectivity used as point sensors for measurements as well as remotely deployed systems for early indications and warning; improved laboratory techniques for forensic analysis of extremely small samples; integration of sensor and information processing technologies for data fusion; simulations; and response option development.

The milestone schedule for this program for FY95 and FY96 include:

Design nuclear, chemical, and biological weapon modeling and monitoring systems that include advanced sensors and information processing of open source and intelligence data.

Demonstration of advanced radiation sensor systems.

Design and prototype development of advanced chemical and biological sensor systems to include collectors, concentrators, analyzers, and data display systems; field test initial chemical and biological weapon sensors.

Characterize emissions from chemical weapon (CW) production sites and the associated background environment.

Provide refined laboratory techniques for forensic particle analysis and gas separation methods.

Produce automated laboratory noble gas sensor system for nuclear test monitoring.

Develop and produce first sets biological weapon/chemical weapon agent detection technologies for monitoring or battlefield use.

Provide prototype application tools for requirements, design, development, and monitoring application.

Produce fieldable advanced prototype atmospheric radionuclide monitoring system.

Provide demonstrations of information processing technologies that provide early indication of proliferation activities.

Develop technology for non-intrusive tags to track weapons of mass destruction.

Question. Last year's Defense Appropriations Act required the Department to submit a report providing this kind of information for every arms control research project. We have not received it. Have you participated in preparing such a document?

Answer. ARPA has provided information on the counterproliferation research program to various groups in the Department responsible for preparing reports to the Congress on the Department's overall counterproliferation effort as well as long-range development plans for the Department. For example, the Department has recently transmitted a Report on Nonproliferation and Counterproliferation Activities and Programs to the Congress.

Question. That report also required DoD to submit the comments of the Arms Control and Disarmament Agency about potential contributions of each research project to our national arms control objectives. Have you asked ACDA for its comments on your counterproliferation program? If not, why not? If so, what is ACDA's position?

Answer. ARPA participates in various interagency committees that coordinate ongoing and planned research on proliferation monitoring technologies. Perhaps the most comprehensive of these coordination mechanisms is the interagency Research and Development Coordinating Committee of the Director of Central Intelligence's Nonproliferation Center. This group includes representatives from the intelligence community, the Department of Energy, the Department of Defense, and the Arms Control and Disarmament Agency. All of the nonproliferation programs of these Agencies have been reviewed by this group.

The Arms Control and Disarmament Agency has created the Arms Control Research Network (ACORN) database to track arms control R&D and to provide information to interested parties on R&D carried out by U.S. government Agencies. ARPA has worked closely with ACDA to participate in providing information on research and development programs for this database.

SEISMIC MONITORING

Question. I understand DOD may have made some changes in this program, including moving some functions to the Department of Energy. Can you confirm this?

Answer. As a result of the development of a coordinated Administration-wide plan to prepare for negotiating and verifying a Comprehensive Test Ban treaty, the ARPA program was given increased responsibilities for the development and testing of advanced technologies for applying advanced signal processing techniques to the large volumes of data from a variety of sensors, including radionuclide and other sensors. This new emphasis is reflected in the President's request to the Congress for FY95. The ARPA program in advanced seismic sensor development, including the demonstration of high performance array technology, was transferred to the Air Force to be implemented in specific projects. The advanced sensor technology which has been developed by ARPA is available to the general research community in addition to the Air Force. Responsibility for longer term research and development on seismological techniques for wave propagation and event characterization will be transitioned to the Department of Energy.

Question. What is included in your budget request for seismic monitoring, and what funding do you project for the next several years?

Answer. As indicated above, the FY95 program will be focused on developing and testing advanced signal processing technologies with emphasis on automation to handle the large volume of data required in a treaty monitoring environment. Also included in the program is the incorporation of processing techniques applied to nonseismic sensors and the fusion of this information with the seismic systems. Funding for ARPA's Comprehensive Test Ban verification readiness program is $15.4 million for FY95. The funding for the next several years will be approximately at this level unless some unforeseen research and development requirements arise from the Comprehensive Test Ban Treaty (CTBT) negotiations and implementation and are assigned to ARPA to support.

Question. Over the long term, what do you expect ARPA's role to be in seismic monitoring?

Answer. The current ARPA program plan targets the development of advanced technologies required to negotiate and monitor a Comprehensive Test Ban Treaty. Development of these technologies required to complete and implement the CTBT is the highest priority in the next several years. In this treaty, there is a major role for seismic monitoring. Over the longer term, it is expected that the program will be focused more on the technologies for the global monitoring of the nuclear nonproliferation treaty. The central focus of this program would be on the early detection of a foreign nuclear weapon development program rather than on the testing of a completed nuclear weapon. Seismic monitoring therefore will play a far less important role in such a program.

Question. Last year, this Subcommittee also expressed concern that much of the seismic monitoring budget was used for travel to Geneva and construction of a seismic station in Egypt, neither of which appears to constitute "advanced research". What is the status of these activities?

Answer. ARPA has provided technical experts who serve on the U.S. Delegation to the Conference on Disarmament in Geneva where the Comprehensive Test Ban treaty is currently being negotiated. However, R&D program funds are not used for this support. Responsibility for the installation of the advanced seismic array facility in Egypt has been transferred to the Air Force.

Question. Please provide details about the proposed Egyptian seismic station. Why is it needed? Has it been installed? Who will pay for operations and maintenance?

Answer. The advanced sensor equipment and electronics for this site have been developed. The equipment has been tested at a site in Texas, including the testing of low-cost installation techniques. No FY94 funds have been applied toward the installation of this equipment in Egypt because of the Congressional reduction to this program. The responsibility for the installation and operation of the array has been transferred to the Air Force. The site for the advanced array in Egypt has been identified as a primary detection site for events in the Middle East by the Conference on Disarmament group designing and testing the international monitoring system for a CTBT. It is expected that when the equipment is installed at this site, the data will be very important in providing seismic monitoring coverage of critical sites in the region.

Question. Dr. Denman, I have heard rumors that over the years ARPA has engaged in several "sweetheart" deals with contractors and universities who hire former ARPA employees. Are you aware of any such arrangements?

Answer. Any rumors that you might have heard to this effect are false. ARPA has no such arrangements. I know of no pattern that would even suggest such a deal. All post ARPA employent issues are governed by the appropriate ethics laws and regulations. ARPA General Counsel counsels departing employees and reviews post employment activities. Awards of contracts are determined on technical merit and in conformance with DoD procurement regulations.

[CLERK'S NOTE.—End of questions submitted by Mr. Sabo. Questions submitted for the record and the answers thereto follow:]

COMPUTER INTRUDERS

Question. "The Internet" is a term to describe the informal, worldwide network of computers which involves 2.2 million computers and as many as 20 million government, industry, or private users in a number of countries. Some DoD applications (like logistics, personnel, and finance) are processed on computers which are hooked into the Internet. DoD has discovered that as recently as last November, intruders used Internet to gain entry into computers at numerous military installations. Some say that for a while these computers were no longer under the control of the U.S. government. Dr. Denman, please describe in layman's terms the recent Internet "incidents." Discuss the significance for both DoD and for National commercial systems.

Answer. In general terms, an unauthorized software package which is called a "sniffer" was inserted in a number of computing systems through which network traffic passes. The function of the sniffers was to intercept user login information on accounts and their passwords and to save it for later use. Both the insertion of the sniffers and the use of the information they collected represent unauthorized access to computer systems. The real significance of this incident was not the fact that this occurred, since some previous small scale examples have been observed in the past, but that this was the largest scale attack using this particular approach on the Internet observed during the past five years (since the Internet Worm).

The actual protection used at any time is a balance among the perceived threats and risks, the costs of the protection measures, and the willingness of the user community to take the necessary measures. Different communities connected to the Internet make their own judgments about the measures they should take. To protect internal ARPA systems, we have implemented a convention referred to as a "firewall." This mechanism safeguards internal ARPA communications from intrusion by external sources while providing ARPA users the capability to access Internet resources.

The lessons learned in this recent incident, and over the past five years of rapid growth of the Internet, provide important insight into how we should prepare for the future even larger scale National Information Infrastructure (NII) and the related Defense Information Infrastructure.

Question. Is it true that intruders actually took over the control of military support and research computers, read and stole files, installed trick software (called "Trojan Horses" and "Back Doors") to gain reentry, examined software under development for future weapon systems, and in some cases, even destroyed files?

Answer. ARPA does not have an operational role in this area. The Defense Information Systems Agency (DISA) has done an assessment of the defense systems that were affected. To the best of my knowledge only some unclassified systems with unprotected interfaces to the Internet or those using unprotected passwords were affected.

Question. Individually describe what was discovered specifically in the computers at: Wright Patterson AFB; the Army Laboratory;

the Defense Finance Agency; the Naval Surface Warfare Center; and other DoD research laboratories.

Answer. DISA should be able to describe how the specific sites were affected. We do not have this information.

Question. How were these intrusions discovered?

Answer. The first indication that a large scale use of a sniffer based Internet attack was underway occurred when some file systems began to overflow as the result of the large amounts of information being collected by the sniffers. Inspection of these files led to a discovery of the unprecedented massive nature of the attack. In addition, various systems that were broken into were traced to the information in these files. Initial smaller scale intrusions appear to have been used to put in place the foundation for the much larger scale intrusion.

Question. How serious a problem do we have?

Answer. While the scale of the attack was massive in terms of the number of accounts that were compromised by having their passwords intercepted, the response of the Computer Emergency Response Team (CERT) System was extraordinarily fast and comprehensive. The CERT System coordinated a number of teams in the detection, diagnosis, corrective actions, and assisted law enforcement efforts.

The vulnerabilities that were exploited and ways to deal with them have been understood by the technical community since the time of the Internet Worm over 5 years ago. A variety of protective technologies have been developed and deployed by some sites. The real issue is ensuring that the diverse user communities recognize the risks and are willing to put in place the appropriate protection. This involves both equipment costs and an additional burden on users. Events such as this play an important role in educating the community through real experience.

While this event was very serious in terms of its massive scale, it was also very helpful in demonstrating the effectiveness of the CERT System, and in educating the user community in relative risks and costs in the experimental world of the Internet. This will help us all prepare for the NII of the 21st century.

Question. Describe the role of the Computer Emergency Response Team which ARPA established at Carnegie Mellon University. How much is budgeted for CERT in FY 1995? How much additional funding could productively be used to provide increased protection to DoD and other users?

Answer. The CERT System and the CERT Coordinating Center at the Software Engineering Institute [SEI] was established by ARPA shortly after the Internet Worm. The CERT was formed to provide an emergency response mechanism for the rapidly growing and diverse Internet of computing systems in the "gray area" of the research community. This is the area that exists between the commercial world and the government world. Since it was formed, it has helped establish over 20 other small teams that deal with specific communities in industry or government including some international teams.

The CERT has testified before other committees and has produced an excellent description of their role, their resources, and their own estimate of additional capability which could be achieved with more resources.

The FY94 budget for the ARPA CERT is approximately $3 million. The CERT budget could be productively doubled over the next two years to provide a capability to keep pace with the expected growth of the Internet.

Question. What else is ARPA doing to address this problem?

Answer. ARPA has developed a variety of technologies that can be deployed to significantly raise security of the Internet and the systems connected to it. These technologies are being experimentally deployed at small scale, with the intention of full scale deployment across the various user communities as the technologies mature and user acceptance develops. Examples of these technologies include protected gateways, protected passwords, privacy enhanced mail, distributed information systems protection mechanisms, distributed protected file systems, trusted window systems, and trusted operating systems. In addition, extension to the Internet technologies are being developed to deal with needed higher performance in gigabit networks.

Question. What does it say for the operational readiness of the US military when unknown intruders can seize control of the computers supporting DoD financial, logistics, procurement, personnel, command and control, research and development, and other support functions?

Answer. These unclassified sensitive systems should be connected to the Internet through protected gateways and external access to these systems over the Internet should use protected passwords and other protection technologies.

These unclassified sensitive defense systems are trying to deal with the new world of the Internet which itself is an important learning experience. They are trying to make early use of new technologies and should be encouraged to make improvements to deal with the new approaches to interoperate between defense and commercial information systems.

Question. Once an intruder gains access to research files or software under development, how can you trust the products which come out of these facilities?

Answer. A properly configured and managed system routinely creates backup copies of its files and software. The working file system can be restored from the backup copies. Completed versions of systems are normally saved in multiple copies in the event of a system failure. These copies are typically stored in physically different areas isolated from the system to protect them.

Question. The Joint Commission highlighted the need for more attention and resources in information security. Please discuss these recommendations and your support of them.

Answer. There is clearly a need for more attention and resources in information security due to the increased dependence of Defense and the rest of the nation on information technology and the emergence of interconnected systems in the form of a National Information Infrastructure. There is a need for more research and development, deployment of developed technologies, education, and continued monitoring and improvement of these systems.

ARPA is recognized as the major source of national leadership in advanced information technologies. The major advances beginning in the early 1960s include timesharing, computer graphics, packet switched networks, personal computing, internets, scalable computing systems, and the related underlying very large scale integration design technologies and systems software technologies and associated advanced applications. Integral to the development of advanced information technologies is addressing information system security issues.

The commission report recommends the consolidation of R&D in information security [INFOSEC] with the National Security Agency [NSA] as the executive agent. While this may be appropriate for the R&D which will be close to deployed systems, it is important that such a consolidation recognize the special role of ARPA to accelerate the advance of the frontier of information technology and INFOSEC and insure that there are a range of alternative approaches to avoid the surprise of being prematurely locked into an overly specialized and constrained approach. Many of ARPA's projects in advanced information technologies have produced new approaches to information security which were eventually adopted by NSA. It is critical that ARPA's ability to develop such alternatives be maintained while working closely with NSA, NIST, and other organizations with INFOSEC responsibilities.

Question. In what capacity could ARPA support the DoD in information security?

Answer. ARPA's focus is the frontier of the field and early experimental use of advanced technologies. ARPA's longer term and more fundamental focus complements other DoD INFOSEC programs. When ARPA is developing next generation information technologies, it has the opportunity to gain early insight into future INFOSEC issues which would not otherwise be addressed by the nearer term projects which are necessarily more focused on existing systems and applications. History has repeatedly shown the benefits of having independent advanced research that is coupled to nearer term research, development, and deployment. This provides significant risk reduction through early insight at a small cost. Sustained US leadership in information technologies including INFOSEC can be traced to ARPA investment in advanced alternatives.

ARPA is also addressing the test and transition of advanced security technologies into DoD operations. In collaboration with the Defense Information Systems Agency (DISA), ARPA is testing these technologies in experimental networks as well as planning for their operational transition into DISA operations. The ARPA/DISA Advanced Information Technology Services Joint Program Office is working with ARPA, DISA, and NSA to insure the most rapid possible transition of advanced security technology into DISA's leading edge services.

HIGH DEFINITION SYSTEMS (HDS)

Question. What are the goals of the ARPA high definition display development program?

Answer:

a. Creation of a robust flat-panel display industry for military (and commercial) competitiveness, including: infrastructure; display technology; manufacturing; and systems.

b. Technology: Enable "information windows" to be applied to new domains by making high-definition display systems thinner, brighter, more power efficient, more mobile, more integrated with computing, and more effective in human terms.

c. Affordability: Develop affordable enhanced display products for DoD systems.

Question. How much has been invested to date, both by ARPA and by industry, in this technology?

Answer. To date, from fiscal year 1990 through fiscal year 1994, $394 million has been funded by ARPA for the High Definition Display Program. The amount of industry investment is unknown at this time.

Question. What results have been achieved so far?

Answer. At the outset, the HDS program placed a heavy emphasis on display technology research and development. The first phase of the program has been a success, resulting in numerous technical accomplishments, some of which are highlighted as follows:

a. The world's highest resolution active-matrix liquid crystal display (AMLCD) with 6.3 million pixels (3072 horizontal x 2048 vertical) on a 13 inch diagonal screen was demonstrated by Xerox Corporation.

b. The world's first thin-film electroluminescent (TFEL), 10 inch diagonal, full-color, 640 x 480 display was demonstrated by Planar Systems. This display overcomes previous color limitations by providing a new blue TFEL phosphor with good color and improved brightness.

c. A 30-inch diagonal, 1024 x 786 full-color plasma video monitor was demonstrated by Photonics Imaging. This is one of the largest full-color flat panel displays demonstrated to date and, when compared to similar-size CRTs, has reduced power, thickness, and weight.

In 1993, the HDS program entered a new phase. In addition to the technology consideration, the program also entailed the acquisition of manufacturing knowledge:

a. Optical Imaging Systems will develop an AMLCD manufacturing technology and demonstration facility. This is a five-year, $98 million, jointly funded effort, with ARPA initially investing $24 million. The facility will respond to military requirements for advanced displays and will also serve as a dual-use entry into the large commercial market.

b. The U.S. Display Consortium (USDC), composed of display manufacturers working to improve manufacturing equipment, components, software, and materials infrastructure, received a $20 million award.

c. The National Center for Advanced Information Components Manufacturing (NCAICM), a $60 million award for a cooperative program among industry, the Department of Energy and Defense, supports manufacturing of flat-panel displays and microelectronics.

d. The Phosphor Technology Center of Excellence, a team led by the Georgia Institute of Technology, combines resources from research and development, education, and technology transfer to industry. Phosphors are used in various display products, from cathode ray tubes to backlights for AMLCDs.

Question. How will the $68 million requested for fiscal year 1995 be used?

Answer. The $68 million requested for the HDS program will:

Develop and demonstrate:

Portable equipment and cockpit flat panel displays (FPDs) including: gray scale document-resolution active matrix liquid crystal displays (AMLCDs); small area color field emission displays; low power color electroluminescent displays.

Next generation FPD manufacturing equipment including photolithography, in-process test and plasma deposition.

Large-screen displays based on laser projection.

FPD enabling technologies including laser light sources for projection, printed low cost color filters, improved driver packaging techniques and more manufacturable AMLCD arrays with improved performance.

Improved image compression techniques, displays interfaces and display processors.

Through the US Display Consortium, develop the domestic equipment, components and material supply base critical to flat panel display manufacturing including color filters, glass inspection, polymer coatings, and plasma etching.

Develop phosphors critical to electroluminescent, field emission and plasma displays at the Phosphor Technology Center.

Question. What could be accomplished for higher levels of funding for HDS?

Answer. The current funding plan of $68 million is believed to be adequate to sustain the technology area, however at the $100 million level the following additional areas could be funded:

Strengthen domestic flat panel display manufacturing infrastructure by supporting the US Display Consortium to develop equipment, components and materials including finished glass substrates, driver chip interconnect tool, liquid crystal cell assembly tool, polarizers and large area exposure tools.

Start development of paper-like reflective displays for low power portable applications (e.g. personal navigation systems and electronic manuals).

Develop printing processes and equipment (ink jet, electrodeposition and offset) to deposit and pattern photoresist, metals, insulators and semiconductors over large areas in a single step in order to substantially reduce the cost of manufacturing flat panel displays.

Increase resolution and compactness of interactive large screen displays to meet DoD (and commercial) critical command and control needs.

Develop low cost graphics-resolution rear projection workstation display using reduced-cost digital micromirror device.

INFORMATION SUPERHIGHWAY

Question. ARPA leads a multi-agency effort to develop next-generation computing technology, which the Vice President has adopted as his "information superhighway" program. The budget requests $357 million. Please explain the concept of an "Information

Superhighway" and describe the status of the Federal high performance computing and communications (HPCC) initiative.

Answer. The "Information Superhighway" is a vision described by the President and Vice President as a system to deliver to all Americans the information they need when they want it and where they want it—at an affordable price. This will require a variety of new technology, policies, and applications to be developed and deployed between industry, government and academia. The Federal HPCC initiative is a coordinated Federal R&D program to develop critical technologies needed for high performance computing and communications which also include information-intensive needs. It works very closely with other Federal programs responsible for developing these technologies, as well as the Information Infrastructure Task Force established to help determine the policies needed for the "Information Superhighway."

Question. Describe the role of each of the Federal agencies involved in this effort.

Answer. Each of the Agencies have a complementary and coordinated role. The best overall descriptions of these roles is included in the report, "High Performance Computing and Communications: Toward a National Information Infrastructure," a supplement to the President's FY94 budget, as well as the report, "High Performance Computing and Communications: Technology for the National Information Infrastructure," a supplement to the President's FY95 budget. Copies of both reports can be obtained through the National Coordination Office. ARPA has been a lead Agency in the Federal program since it began in 1992.

Question. The Committee has had a concern about the balance between "massively parallel" and "parallel vector" supercomputer technologies. How have our concerns been addressed?

Answer. "Massively parallel" and "parallel vector" have started to evolve into "scalable parallel" technologies. ARPA investments are stimulating progress in both areas. For example, ARPA recently completed a three year, industry cost-shared program with Cray Research that developed some of the key technologies used in the new Cray T3D. Not only was this system developed in record time, but it combines capabilities of both technologies. Other computer vendors are also adopting vector capabilities.

Question. How will the fiscal year 1995 funds be used?

Answer. The referenced $357 million is an ARPA-wide crosscut reported to the Federal Program. The primary investments by ARPA are contained in the High Performance Computing Project (ST–19), which is requesting $243.7 million. This project will continue to develop the software and hardware technologies leading to a scalable computing and communications technology base for systems configured over a wide performance range for both the Defense and the commercial sectors.

Question. What is the total cost of the HPCC initiative, by agency and in total?

Answer. The Federal Program has just recently published the FY95 Implementation Plan, which describes in detail the total cost of the HPCC initiative and by Agency. Copies have been sent to your staff and we would be happy to provide additional ones if necessary. The total cost is $1.154 million for all Agencies, with ARPA's request of $357 million.

Question. When will this program end?

Answer. The Federal HPCC program was intended to be a 5 year program; however, a new component, the Information Infrastructure Technology and Applications (IITA) component was added in FY94. High Performance Computing, ST–19, in DoD will extend to FY99.

ADVANCED SHIPBUILDING

Question. The Congress has had a longstanding concern about the fragile health of the nation's shipbuilding industry. The budget requests $132 million for ARPA maritime systems programs. What is ARPA trying to accomplish in this area?

Answer. ARPA's requested budget for maritime systems programs is $132 million. Of this, $40 million is to support the MARITECH initiative, which is specifically addressed in the response to the next question. In addition, ARPA is investing in leading edge technologies across a broad range of applications addressing maritime issues. These applications have two major thrusts, affordability and contributions to increasing maritime capabilities in littoral warfare.

The affordability thrust encompasses four programs: MARITECH, Simulation Based Design, Ship Systems Automation, and Advanced Submarine Technology. The overall emphasis in these programs is on reducing the cost of designing, building and operating ships and submarines, by streamlining the design cycle, reducing the crew size and by using innovative materials and technologies to reduce life cycle costs.

The littoral warfare capabilities thrust includes three programs: Unmanned Undersea Vehicles/Mine Countermeasures, Antisubmarine Warfare (ASW) Shallow Water, and C^3I/Synthetic Environments. These programs emphasize technologies to enhance the ability of maritime forces to operate in the demanding shallow water environment in both defensive and offensive scenarios. Clandestine mine detection and location, detection of submarines in the complex acoustic conditions of shallow water, and the fusion of data relating to the overall management of the maritime battle scene are major areas of emphases in these programs.

Question. Explain the goals of the MARITECH initiative and how the $40 million requested for fiscal year 1995 will be used.—What is the total cost of the MARITECH initiative?

Answer. MARITECH is a FY94 Administration initiative of the National Economic Council, proposed to the Congress, to enhance the commercial viability of the US shipping industry. MARITECH will apply advanced technology to foster commercially competitive shipyards and improved design, development and production processes. MARITECH will be a joint-funded, cooperative program of industry and government that will address the technological issues impacting the United States competitive position in the world's commercial shipbuilding market.

MARITECH is sponsoring, beginning in FY94, near-term, focused technology development projects that will enable shipbuilders to master the basics of world-class shipbuilding practices and competitively enter the burgeoning world market. The primary thrust in the near term is to rapidly identify and implement state-of-the-art technologies that will enhance productivity and facilitate international market penetration within the next two to three years. This penetration is essential if the shipbuilding infrastructure is to be maintained in the face of declining DoD demand.

Approximately $30 million in the FY95 funding will be used to initiate new focused technology development projects and continue the projects begun in FY94. Linked with the initial effort of near-term design, development and process improvement must be a longer-term technology development effort to put in place an integrated national infrastructure of maritime technology interests for the purpose of promoting continuous product and process improvement in ship design and construction. The remainder of FY95 funding will be used to fund specific, basic shipbuilding technology research and development projects to be solicited from industry through a Broad Agency Announcement scheduled for release in early FY95. MARITECH is an integral part of the Technology Reinvestment Project in FY95.

The MARITECH funding stream described by the President in his October 1, 1993, Report to the Congress was:

Fiscal year:	*Dollars in millions*
1994	30
1995	40
1996	50
1997	50
1998	50
Total	220

Question. What is the status of the Congressionally-initiated advanced submarine technology program, and how will the $25 million requested for fiscal year 1995 be used?

Answer. Under this program, innovative technologies continue to be developed to enable US submarines to operate in an evolving environment characterized by the threat of quiet diesel submarines and the proliferation of advanced submarine and weapons systems. Responding to this threat, ARPA is pursuing efforts that will enhance US capability to engage in littoral operations using submarines with quiet, affordable structures. Efforts are concentrated in the three broad areas of hydrodynamics, advanced materials and active structural control.

In the first area, the hydrodynamic and hydroacoustic performance of marine vehicles is being enhanced through the development of unique flow control concepts and supporting instrumentation. Particularly noteworthy is a demonstration of the viability of Electromagnetic Turbulence Control (EMTC) to reduce drag and noise and enhance wake control and maneuvering ability.

The goal of the Advanced Materials area is to provide designers with affordable, efficient and safe composite structures. This is being accomplished through demonstration of affordable thick composites employing embedded sensor systems to ensure structure integrity.

Active Structural Control (ASC) efforts are focused on further developing emerging fundamental knowledge of how to control structural shock control in order to demonstrate an order of magnitude improvement in vibration reduction.

The $25 million for FY95 will be used for Hydrodynamics efforts to develop and demonstrate EMTC applicants as well as active fluid/structure boundary control concepts; Advanced Materials efforts to complete fabrication, assembly and test of thick composite components and embedded sensors; and ASC efforts to develop and test active shock attenuation techniques, demonstrate a full scale ASC application for turning and boring applications and conduct a feasibility demonstration of ASC concepts to reduce turbine blade resonance.

Question. What are the goals of ARPA's Unmanned Undersea Vehicle program, for which $18 million is requested?—What is the total cost?

Answer. ARPA's Unmanned Undersea Vehicles (UUV) program is focused on the development of technologies that will enable the acquisition of capable UUV systems that can perform specific clandestine missions without endangering personnel. The specific missions to be addressed have been specified by the Navy. As directed by Congress in 1994, the Navy's Director of Expeditionary Warfare has established priorities for the development of UUVs. The first priority is the development of a limited capability near term mine reconnaissance system; the second priority is a greatly improved longer term mine reconnaissance system; the third priority is surveillance and intelligence collection; and priority four is the development of additional missions based on technology developments. All of the technologies being developed within ARPA's program are important for the development of a mine reconnaissance system, and many, such as long endurance power, are applicable to all missions. The technologies being developed at ARPA will enable the Navy to meet the needs reflected in the Navy's statement of priorities.

The total cost of the program to date has been $168 million in which $142 million was provided by ARPA, while $26 million was provided by the Navy.

Question. Describe ARPA's plan for shallow water ASW research?

Answer. The most likely environment in which Anti-Submarine Warfare (ASW) will be conducted has changed from the deep ocean to shallow water (littoral warfare). Consequently, the focus of this project has shifted from examining innovative technologies for operations in the deep ocean to those employed in acoustically complex shallow water.

The ARPA shallow water ASW research plan is emphasizing environmentally adaptive sonar technology and ASW scene management.

In the sonar technology area, applications of advanced object (submarine) detection, classification, and localization technologies are being demonstrated in cluttered shallow waters using high performance computing (HPC). This includes simultaneous target detection, localization, and tracking algorithms using distributed active and passive sensors. Efforts to select the best operating range, and to incorporate enough flexibility into the sources and sensors are also being pursued. The work will also produce a demonstration of multi-sensor fusion through automatic detection and classification algorithms for combining non-acoustic sensor data with both active and passive acoustic data, and provide a capability to display, geographically, a complete description of the maritime tactical scene. In addition, vertically directive low frequency sources of both a continuous and impulsive nature are being developed and demonstrated.

In the ASW scene management area, signal processing techniques are being developed to integrate real-time information with background intelligence to provide a complete picture of the shallow water operational situation.

ADVANCED SHORT TAKEOFF VERTICAL LANDING (ASTOVL)

Question. The budget requests $20 million to develop an Advanced Short Takeoff and Vertical Landing (ASTOVL) aircraft. If successful, this could blossom into a replacement for the F–16, AV–8B, and F–18 aircraft. Please describe ARPA's strategy for ASTOVL aircraft development.

Answer. Based on progress in the current technology validation phase, ARPA in cooperation with the Joint Advanced Strike Technologies (JAST) Program Office, is considering an FY96 initiative for a technology demonstration program to include construction of two prototype aircraft. The prototype program would be patterned after the Have Blue F–117 prototype effort, but unlike Have Blue, would be full scale and include a propulsion system representative of the operational aircraft. These aircraft would demonstrate the combat radius, takeoff and landing performance, and maneuvering performance of a potential operational vehicle. The two aircraft would be identical and each would be factory reconfigurable from the short takeoff and landing (STOVL) Navy and Marine Corps configuration to the conventional takeoff and landing Air Force configuration and vice versa. The prototype endeavor would only be undertaken if the current efforts indicate the concepts can meet the future strike aircraft needs of at least two of the three services. In accordance with an informal agreement with the JAST program office, JAST would advise ARPA on the potential usefulness of the ASTOVL concepts, and JAST would share in funding the prototypes if the decision is affirmative. There is also strong British interest in participating in a prototype program.

Question. What are the key technologies that must be demonstrated to make ASTOVL interesting to DoD, and what are the risks?

Answer. The major challenge to the program is to demonstrate that the concepts offer adequate performance for multi-service application at an affordable price, and without one of the service partners being forced to accept a significant cost or performance penalty to achieve multi-service commonality. In this regard, the principle risks are considered to be the ASTOVL propulsive lift system and the ability of a small, lightweight aircraft to accommodate reduced signature weapons carriage.

Question. What is the total cost of ARPA's ASTOVL effort?

Answer. The total cost of the program including building and flight testing two prototypes is estimated to be $839 million in FY94 dollars.

Question. Explain how this program has been coordinated with the $2 billion Joint Advanced Strike Technologies (JAST) program.

Answer. JAST is ensuring that Service requirements are being addressed; and will focus on development of subsystems and avionics for follow-on operational aircraft. The proposed technology demonstrator aircraft program would be jointly funded by ARPA and JAST.

Question. How are Navy, Marine, and Air Force requirements being addressed by ARPA's ASTOVL program?—Is it even possible for a single aircraft design to meet 3 services' requirements?

Answer. As indicated above. JAST is providing service needs to ARPA. In addition, the ARPA joint program office is staffed with Air Force, Navy, and Marine Corps representatives. We believe that it is possible for a single aircraft to meet the needs of the three Services; however, there will be some compromises necessary and the Navy desire for two engines will have to be forgone.

SEMICONDUCTORS/COMPUTER CHIPS

Question. What is ARPA's strategy to develop advanced computer chips and the "packages" which contain them?

Answer. ARPA's strategy is to maintain US leadership in both the basic technology as well as flexible low cost manufacturing.

In the packaging arena, we are investing heavily in a new technology for packaging called Multichip Modules (MCMs). MCMs will provide a ten fold increase in the number of integrated circuits that can be interconnected within a fixed volume, while also increasing system performance and reliability, and reducing power consumption. ARPA is now investing resources to ensure that new low cost/high density MCM technologies will be easily accessible by systems designers and to develop new methods of manufacturing that will lower the cost by an order of magnitude. Other than in-house production of MCMs for large mainframe computers, the DoD has been the principal driver for the development of this technology. However attractive new MCM technologies which have resulted from the RPA investments and changing commercial requirements mean that there will be very large commercial market for MCMs which will eclipse the DoD market in size within the next couple of years. Our strategy is to ensure that US based manufacturers are positioned to be leading suppliers to both defense and commercial markets so that the DoD can leverage the much larger commercial production base.

Question. Why is government funding needed?

Answer. MCM technology represents a number of significant paradigm shifts. In addition to new business models, widespread adoption will depend upon a wide range of technologies including design tools, manufacturing equipment, test methods for unpackaged die, and a critical mass of suppliers and customers. Until all of these elements are in place, the risk to a supplier of any one of these elements is very high. The ARPA investment supplements private investment and provides the national focus necessary to succeed.

Question. The budget requests $90 million for SEMATECH. What are your goals for this program, and how will the funds be used—When will the SEMATECH program end?

Answer. ARPA's FY95 efforts will continue to focus on the manufacturing tools and methodologies needed for low-cost, flexible, scalable manufacturing to meet defense and commercial needs. Emphasis will be on combining advances in manufacturing equipment with software innovations to enable state-of-the-art microelectronics manufacturing facilities capable of producing many part types in rapid turn-around time and with reduced cost sensitivity to manufacturing volume. The primary strategy at SEMATECH is to stay very focused on sustaining the improved productivity trends that the industry has achieved over the past number of years. These productivity gains are in large part, a result of improved processes, equipment and factory integration. These areas will continue to receive priority investments at SEMATECH, with a large portion of the joint industry/government funding going to key industrial suppliers.

Funding for SEMATECH is reconsidered each year by ARPA. ARPA believes that the DoD needs to support semiconductor manufacturing, but whether all the ARPA funds in that area go to SEMATECH or only a portion depends on reaching a satisfactory agreement on the SEMATECH plan for that year.

Question. Lithography is a process for making computer chips. The budget requests only $10 million in FY 1995, compared to $58 million a year ago. How much would be needed in FY 1995 for a "robust" advanced lithography development program?

Answer. Lithography is one of the most critical components of semiconductor manufacturing lines in terms of achieving desired competitive product capabilities. It is also one of the highest cost areas in terms of both capital equipment costs (typical systems can be over $1 million) and development costs for the next generation systems. This past year has been extremely volatile. The number of industry players has declined dramatically, and one player has announced intent to partner with foreign firms. Currently Japan (Nikon and Cannon) dominates this market. In the US, it appears that only Silicon Valley Group (SVG) will be competitive for leading edge lithography systems. Since this industry shake out, two aspects have unfolded: The Semiconductor Industry Association (SIA), in cooperation with SEMATECH, has taken on the job of rebuilding the industry investment strategy; US industry is increasingly expressing its intention to work with SVG, primarily through equipment purchases.

Given this unstable industry status, ARPA has reduced its support to lithography in FY95: however, we are aggressively working with the industry to redefine an investment strategy. We are confident that this strategy will be in place for our FY96 budget cycle.

When an industry consensus emerges a "robust" advanced lithography program will need a funding level of at least $50 million per year including investments made under the SEMATECH program, for the next five years to establish a 0.18 micron and smaller technology needs.

Question. Explain the goals of the President's recently announced initiative to improve the competitiveness of the U.S. electronics industry. What is the problem? What is the solution? How much is requested in 1995 for this initiative? What is the total cost of the initiative?

Answer. The electronic packaging industries consist primarily of small suppliers who provide critical equipment, materials, and services to the semiconductor and electronics industries. In the past, US semiconductor companies have located their assembly operations offshore to take advantage of low-cost labor. This has contributed to the erosion of the domestic supplier infrastructure. For most products manufactured by US companies, packaging was not a significant competitive factor. (One exception is the mainframe and supercomputer industries where system clock speeds were high enough that packaging was a major bottleneck. For those applications, the US still holds the technological edge, and a reasonably strong domestic manufacturing base.) Increases in semiconductor device performance and product trends towards compact battery powered products means that packaging is becoming increasingly important for most mainstream products, either to stay on the semiconductor performance curve or to reduce the size and weight of the product. For these critical, high-volume products, the US lacks the low cost production base to satisfy domestic needs. This is important for DoD since defense systems will increasingly rely on leveraging a commercial industrial base.

Last month Secretarys Perry and Brown jointly announced an administration action plan to enhance the competitiveness of US packaging industries. The plan includes actions to increase industry/government cooperation, expand industry-led development and supplier qualification programs, sustain federal investments in advanced technologies, and reduce barriers between defense and commercial markets. The plan also includes a new initiative funded through the TRP program which will address the need for high volume, low-cost production capabilities. By working closely with industry, which has also recognized the increased importance of electronic packaging, and by leveraging our lead in innovative packaging approaches, we can substantially strengthen this critical sector of the industrial base. The discontinuity in the development of packaging technology from single chip modules to MCMs provides an opportunity for new suppliers to enter the market.

No increase in funding is being requested from Congress to implement the Administration's action plan. The focused TRP program of $30–40 million over two years will be funded from the existing TRP budget. This will compliment ongoing programs across the federal government which totaled approximately $150 million in FY94. The ARPA request for ongoing packaging programs is approximately $80 million in FY95. Outyear support for this initiative will be addressed in the FY96 budget cycle.

ELECTRIC/GAS VEHICLES

Question. Last year, Congress provided $46 million for electric vehicle development and $15 million for natural gas vehicles. Explain how ARPA will use these 1994 funds.

Answer. ARPA will solicit 24-month proposals for electric and hybric vehicle technology from geographically dispersed consortia. The program requires at least 1:1 federal/non-federal cost-share of cash for in-kind contributions. ARPA's mission in this program is to conduct research and development on critical electric and hybrid vehicle technology and demonstrate its potential for the Armed Forces and commercial sector.

ARPA seeks innovation in the following technology areas for light duty applications through higher powered military systems:

(1) Power Generation, including devices with high-specific power generation sets such as high-speed free-piston engine generators with the capability of using multiple fuels;

(2) Power Control, including the exploration of high-temperature power switch semiconductors, advanced motor/controller designs, and energy management;

(3) Energy Storage, including high-energy-density batteries, flywheels, capacitors, and efficient battery charging;

(4) Electromechanical Conversion, including permanent magnet, alternating current induction, DC brush-commutated, DC brush-homopolar, reluctance, and linear motors; drive train components; and high-efficiency ancillary systems;

(5) Vehicle and Component Manufacturing and Safety, including lightweight, high-strength composites and other materials; flexible composite layup, real-time process control, crash test and simulation, dual-use concurrent engineering, and integrated product and process development (IPPD).

The Natural Gas Vehicle Program will convert conventional non-tactical vehicles to natural gas and develop supporting infrastructure for testing on Air Force, Navy, and Marine Corps installations to assess performance, life-cycle and energy cost savings, and environmental impact. Specific natural gas research areas include; multi-fueled auxiliary power units, storage, conversion devices, pumps and compressors, and sensors. Selected natural gas technologies will be integrated into hybrid electric tactical combat vehicles for primary power generation and non-tactical vehicles for range extension.

Question. What are the benefits of such research to DOD? To the nation?

Answer. The survivability and lethality of future strategically deployable combat vehicles can be significantly improved by new drive train and propulsion technology. The solution requires hybrid electric drive systems that enable greater deployability, significant improvements in mobility while providing the electric power demanded by advanced sensors, emerging weapons, and power-intensive survivability subsystems. These technologies will provide military systems great flexibility in the location of drive elements; permit reduction in vehicle silhouette, signature, and volume under armor; as well as increase mobility and deployability.

The commercial use and development of these technologies will ensure that we have the world lead in this area. Hybrid and electric vehicle technology is the future of all ground transportation. Every other country in the world with a vehicle production capability is pursuing this technology. It will give us vehicles that use significantly less fuel per mile driven while reducing both acquisition and operating cost. It will also give us vehicles made of different materials and made in different ways.

The FY94 Natural Gas research effort will benefit both the military and the nation and will involve the exploration and development of new concepts and components suitable for installation and development of new concepts and components suitable for installation into both military and commercial vehicles. National benefits of this program are derived upon the recognition that the utilization of natural gas burning vehicles and equipment will help improve air quality and ease our dependence on foreign fuel sources. The primary objective of the research effort is to explore the technical feasibility of advanced concepts and components to increase the overall capabilities of the military and to successfully transition the technology to the private sector for potential commercial application.

Question. Why are no funds requested in fiscal year 1995 to continue these programs?

Answer. As in FY93, the hybrid/electric vehicle technology is being considered under the Technology Reinvestment Project.

[CLERK'S NOTE.—End of questions submitted for the record.]

WEDNESDAY, MARCH 9, 1994.

NUCLEAR DISARMAMENT OF THE FORMER SOVIET UNION

WITNESSES

HON. ASHTON B. CARTER, ASSISTANT SECRETARY OF DEFENSE, NUCLEAR SECURITY AND COUNTERPROLIFERATION

DR. HAROLD P. SMITH, ASSISTANT TO THE SECRETARY OF DEFENSE, ATOMIC ENERGY

INTRODUCTION

Mr. MURTHA. The Committee will come to order.

The subject of this hearing is the Nuclear Disarmament of the Former Soviet Union. I want to welcome the Honorable Ashton B. Carter, Assistant Secretary of Defense for Nuclear Security and Counterproliferation and Dr. Harold P. Smith, Assistant to the Secretary of Defense for Atomic Energy.

This is a program which obviously we are very interested in. Over the years the Committee has been instrumental in seeing this is funded. I don't know that you could spend the money that is talked about. There has been a lot of talk on the House Floor, and in the press about the money. But we came up with the money.

I remember vividly coming up to start this program and putting restrictions on it in order to get it through the House of Representatives. Those restrictions were that $400 million would go specifically for dismantling the nuclear weapons. Mr. McDade and I worked on this with Senator Inouye and Senator Stevens and restricted $100 million for transportation and airlift. That was in the supplemental in 1992.

Every year since then I understand we have provided $400 million with those same guidelines. We would be interested in seeing how successful it has been, how the money is being spent, and obviously whether you recommend that we continue the program.

We shall place your statements in the record. If you would briefly summarize, we shall begin the questions.

SUMMARY STATEMENT OF MR. CARTER

Mr. CARTER. Thanks, Mr. Chairman. I will begin, if I may, and let me begin by saying this is the first time I have appeared before you regarding this program, and it is a pleasure to be here.

I am going to try to direct what I say, Mr. Chairman, to the points you just raised, namely is this program, now two years into its lifetime, actually accomplishing on the ground what it was intended to accomplish?

Second, is it being implemented effectively?

And third, do we know where we are going with this program in the future?

And I, in my opening comments, want to make just two points, Mr. Chairman, both of which have a theme, which is that this program is an unusual one for us in the Department of Defense. I know it is an unusual one for you and this committee as well.

It is unusual in two respects. First, it is not often that history gives it to us to literally participate, cooperate and assist the disarming of potential opponents and the elimination of weapons aimed at this country. It is unusual in that regard.

It is also unusual in the way the program works. And I would like to spend a little time describing the process by which it works, because that explains why, for example, we have requested a great deal of authority from the Congress to enter into agreements with these parties, and our contractual obligations are smaller than that amount. I know that is a question that you have. And the reason for that can be seen in reference to the process.

Let me start with the first point, the first sense in which it is unusual, which is that it is unusual to have the opportunity to literally dismantle a military threat that we have spent trillions in the past to counter. I thought I would give you a couple of examples of things going on right now which are directly reducing the military threat to the United States and would not be happening were it not for this program, so that you will see that even at this relatively early stage of the implementation of the program, it is having real effects.

The first example I would like to give is what is going on today in Ukraine. We had an opportunity to discuss that very briefly before the hearing began. But just this week, the first warheads left Ukraine for Russia. The beginning of the process we have been aiming now for quite a long time, the eventual denuclearization of the Ukraine.

Ukraine has agreed in the agreements signed by the President in January to completely eliminate all nuclear weapons on Ukrainian territory, and therefore from the point of view of our security to remove the possibility that there will be a new nuclear nation in the middle of Europe.

I was involved in those negotiations, and there was absolutely no question in anyone's mind that our willingness to assist them in carrying out this undertaking was critical to their stepping up to this undertaking. That is noted in the trilateral agreement.

Mr. MURTHA. Say that again, because Mr. McDade deserves a lot of credit for what we worked out. I want him to hear what you said.

Mr. CARTER. I was speaking of the movement of nuclear warheads out of Ukraine, which has just begun this week and which is a consequence of the agreement between Russia, the United States, and Ukraine to do that, and I was saying that I was present at those negotiations and there was no question that our willingness to assist them in carrying out this task through this program was critically important to getting them to step up to actually doing it. Also critically important to President Kravchuk's ability to persuade his parliament to go along.

You remember, before the agreement many people thought they would not go along. They did go along, and that is because one of the things they wanted to be sure of before they stepped up to this job was that they would get some help in doing it.

So——

Mr. McDADE. Thanks for saying that, Doctor, because the Chairman and I sweated the program and worked hard to put the money in. I am glad to hear it is working well. I appreciate you taking the time to repeat what you had said.

Mr. CARTER. My pleasure.

I note the 60 warheads because they are just the beginning of what will be almost 1,200 warheads leaving Ukraine, and we will be assisting that entire process. As these warheads are moved from their silos to the trains that will carry them back to Russia, early in the process, just to give you an example of real assistance at work, the Ukrainians asked us, Could we supply them with some vehicles and some fuel for those vehicles to make up the convoys moving the warheads from the missiles to the trains?

Dr. Smith's organization was able within a very short time to provide that assistance, and therefore we are in a mechanical way as well as a political way responsible in a very direct manner for this movement.

I will give one other example of this program at work, and then I will turn to the second issue, which is how the process works. We expect next week that the directors of the International Science and Technology Center, which was one of the early projects under this program, that those directors will meet and give their first set of projects to former weapons scientists in Russia who previously worked on weapons and now will be working on peaceful civil projects, in part inspired by this program. That is another example where what is going on there is not elimination of weapons. It is prevention of brain drain and giving people whose talents could otherwise be put to bad use, getting them doing what they should be doing, which is helping their country rebuild its civil economy.

So we are getting very direct benefits from this program. A number of indirect benefits can be seen as well. Because of this program, the United States is a party to these things. Otherwise, we would just be looking down from space at them. We are there, at the table, on the ground, so to speak.

So we are an active participant. That is not an opportunity we would ever have if we weren't offering this kind of assistance.

Let me turn to the second respect in which the program is unusual, which is the process. And I apologize, it is a little bit boring, but this is a program that is not sort of a normal DOD program in PPBS terms. And the process has three stages.

And this is a process that has been directed by you, the originators of this program, Chairman Murtha, and your colleagues, when you established this program for these purposes a couple of years ago.

The process works like this. First we in the U.S. Government think of something useful that we could do to assist. So we may say to ourselves, Well, maybe they will dismantle warheads faster if we can help them move warheads more quickly to places where they will be dismantled. At that point, we come to you and notify you, We think we would like to help out in this, we think it fits the set of objectives you laid out for us a couple of years ago, and we think it will cost so much money.

That is stage one. Then we go to the potential partners in this venture, namely the Ukrainians, the Kazakhstanis, the Belarussians or the Russians, and we say, Do we have a common purpose here, do you want to do what we want to do? We obviously want to see you dismantle things faster. If you want to do that too, we have got a deal, and we will help you out.

At that point we negotiate an agreement with their government. So we start with this phase where we notify you. Then we negotiate an agreement. And then we implement. Then we go out and give to the American business community an RFP and we begin to award contracts.

So there are three steps in this process. The reason I belabor this is that one of the things that you all have quite legitimately wondered and challenged us about is, why does it take so long to actually write contracts. Two years ago you got this thing started. We have all this authority. And why is it that we have only contractually obligated a little over $100 million? And the answer to that resides in this process.

We have notified you that we have more than a billion, well more than $1 billion worth of useful projects in mind. We waited almost two years before Ukraine and Kazakhstan signed the relevant agreements with us.

In the last year we have negotiated 25 such agreements. But it wasn't until last December, for example, that the Ukrainians signed their agreements. So we have been waiting on them.

Now that they have signed the agreements and the second phase is over, we are ready to implement. And last year we concluded these agreements. We call that the year of negotiation. We got all the agreements in place. This year is going to be the year of implementation. Now that we have these parties agreeing, we are ready to begin implementing.

So it is the fact that the process we have established for this program, where we notify you first and you have to give us the authority to do that first, that occurs at the very front-end. Then we have to negotiate. That has been a very laborious process, because these governments are new, they are chaotic, they have had a hard time kind of getting themselves together in this. And then we are ready to implement. So it is in the nature of the program over the last couple of years that we have this time lag between when you have given us authority and when we have been able to do anything.

I want to take a little time to explain why that was the case, because I know that if this were not an unusual program but a usual program, you would look at it and say, There is something wrong here, these people have all this authority but they haven't obligated it.

On that note I will close because that takes me to the third phase of implementation where my colleague, Dr. Smith, really picks up, and I think he can explain how this will be the year of implementation.

[The biography and statement of Mr. Carter follows:]

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THE HONORABLE ASHTON B. CARTER
ASSISTANT SECRETARY OF DEFENSE
(NUCLEAR SECURITY & COUNTERPROLIFERATION)

Ashton B. Carter is Assistant Secretary of Defense for Nuclear Security and Counterproliferation with responsibilities that include policy with respect to nuclear weapons and other weapons of mass destruction in the former Soviet Union, countering proliferation worldwide, and oversight of the U.S. nuclear arsenal.

Dr. Carter previously served as the Director of the Center for Science and International Affairs and Ford Foundation Professor of Science and International Affairs at Harvard University's John F. Kennedy School of Government, and was Chairman of the Editorial Board of International Security. He has also held positions at the Massachusetts Institute of Technology, the Office of the Secretary of Defense, the Congressional Office of Technology Assessment, and the Rockefeller University.

Dr. Carter received bachelor's degrees in physics and in medieval history from Yale University, summa cum laude, Phi Beta Kappa. He received his doctorate in theoretical physics from Oxford University, where he was a Rhodes Scholar.

Carter is a member of the Council on Foreign Relations, the American Physical Society, the International Institute for Strategic Studies, the National Academy of Sciences Committee on International Security and Arms Control, the American Academy of Arts and Sciences Committee on International Security Studies, and the American Association for the Advancement of Science's Committee on Science, Arms Control, and National Security. He is a Fellow of the American Academy of Arts and Sciences. In 1987 Carter was named one of ten Outstanding Young Americans by the United States Jaycees. In 1988 he received the American Physical Society's Forum Award for his contributions to physics and public policy.

Carter has previously served on the Defense Science Board, for which he chaired several studies on intelligence matters. Carter also has previously served on advisory bodies to the White House Office of Science and Technology Policy, the Office of the Secretary of Defense, the Congressional Office of Technology Assessment, the Carnegie Commission on Science, Technology, and Government, and Sandia National Laboratory, as well as on the board of trustees of the MITRE Corporation and the German Marshall Fund.

In addition to authoring numerous scientific publications and government studies, Dr. Carter co-edited and co-authored Cooperative Denuclearization: From Pledges to Deeds, A New Concept of Cooperative Security, Beyond Spinoff: Military and Commercial Technologies in a Changing World, Soviet Nuclear Fission: Control of the Nuclear Arsenal in a Disintegrating Soviet Union, Managing Nuclear Operations, Ballistic Missile Defense, and Directed Energy Missile Defense in Space.

FINAL

03/08/94

Testimony of Assistant Secretary of Defense

Ashton B. Carter

On the Former Soviet Union

Cooperative Threat Reduction Program

House Appropriations Committee, Subcommittee on Defense

March 9, 1994

1:30 pm

Mr. Chairman and Members of the Committee:

Thank you for the opportunity to describe our recent accomplishments and future plans for the Former Soviet Union Cooperative Threat Reduction (CTR) Program. This is my first appearance before your Committee and I consider it an honor.

INTRODUCTION

I understand that you have three major concerns about the CTR program. First, what is the program actually accomplishing towards the goal of safe and secure dismantlement of weapons of mass destruction in the former Soviet republics? Second, is the program being implemented effectively? And third, does the Defense Department have concrete plans for the future of this program, which will lead to realization of our goals of denuclearization and demilitarization in the FSU republics?

All of these are important questions. We will address your concerns today, and in doing so, give you a report on the CTR program that is far different, and dramatically more positive than we could have given you just a few months ago.

Within the Defense Department, I am responsible for policy oversight of the CTR program. This includes, within the authorities established by Congress, defining what we want to accomplish for U.S. security with this program, and creating and planning projects to serve our goals. My office prioritizes and allocates the funds Congress made available among the various projects. We also coordinate with other departments and agencies, with the guidance of the National Security Council, to ensure that the program is consistent with other US policy and national security interests and does not duplicate other existing U.S. assistance efforts. My representative serves as Deputy Head of the Safety, Security and Dismantlement (SSD) delegation, which presents U.S. proposals for assistance and negotiates the necessary legal agreements with the New Independent States to provide specific assistance.

Because of my responsibilities for policy oversight, I will concentrate today on the accomplishments of the program, the process of putting projects in place in the FSU states and our future objectives. Dr. Smith is responsible for implementing our programs in the former Soviet Union states, and he will describe how we are effectively delivering and monitoring the assistance which supports our policy goals.

The CTR program is essentially a "one-two punch" to push forward our goals of denuclearization in the former Soviet Union. It involves two stages - first diplomacy, then implementation.

To date, the Congress has made available $400 million each year for FY 1992-FY 1994 for the CTR program. The $800 million Congress authorized for CTR assistance in FY 1992 and 1993 has been a potent instrument of U.S. diplomacy. This assistance has been critical in our diplomatic efforts to convince Ukraine, Kazakhstan and Belarus to forego nuclear weapons.

As Ambassador Goodby, head of the SSD delegation has said, without the CTR assistance to open the way for talks, U.S. negotiators would not have had access to negotiating with the FSU governments to convince them to fulfill their pledges to dismantle or eliminate the nuclear weapons on their territories. The assistance agreements we have signed with these states are the mechanism through which they have committed themselves to a concrete program for dismantlement.

After the rapid-fire conclusion of 25 new assistance agreements with the FSU states since last June, the implementation stage, which provides the actual materials and technical assistance to help the republics transport, protect and destroy the weapons on their territories, is now beginning in earnest.

As 1993 was the "Year of Negotiations", 1994 is becoming the "Year of Implementation" for the CTR program.

GOALS AND MAJOR ACCOMPLISHMENTS

The CTR program was established in FY 1992, to address the threats to our security that resulted from the breakup of the Soviet Union. During the first two and one half years, we have pursued seven primary objectives through this program--objectives which were shaped and guided by Members of Congress, including Chairman Murtha. We have made significant progress in every area and we are pleased to report a degree of success that we could hardly have imagined just a year ago.

1) Prevent the Emergence of New Nuclear States:

One of our most important objectives has been to prevent the emergence of new nuclear states in the FSU. Had Ukraine, Belarus, and Kazakhstan, or even one of them, decided to "go nuclear," it would have been harmful to our national security as well as to the security of that region of the world, and to our global goal of preventing proliferation of nuclear weapons around the world. We have worked to convince Ukraine, Belarus, and Kazakhstan to send their tactical and strategic nuclear warheads to Russia for dismantling and in the cases of Ukraine and Kazakhstan, to eliminate the associated strategic nuclear delivery systems from their territory as required by START and the Lisbon Protocol. Belarus is sending its delivery systems back to Russia. In addition to preventing the emergence of new nuclear powers in the FSU, consolidating these weapons in Russia reduces the danger of proliferation of nuclear systems from the FSU to other regions.

As a result of our diplomacy, in which the CTR program has provided critical leverage and reinforcement, Belarus, Kazakhstan, and Ukraine have agreed to denuclearize completely, removing all nuclear weapons from their territories within a short period of time. All three countries have ratified the START I agreement, Belarus and Kazakhstan have acceded to the Non-Proliferation Treaty as non-nuclear weapons states, and Ukraine has committed to do so. We see these decisions already being put into effect today in practical steps which reduce the threat to US security.

Our most important breakthrough was the Trilateral Agreement achieved between the U.S., Russia and Ukraine in January. As a result, a significant number of Ukraine's 46 modern SS-24 missiles have been deactivated. Some older SS-19 missiles in Ukraine also have been deactivated and will soon be dismantled. Shipment of both SS-24 and SS-19 warheads to Russia began last week and the U.S. has been able to provide, on an urgent basis, fuel and other assistance to speed this process of deactivation in Ukraine. Additional CTR assistance for emergency response equipment and missile and silo dismantlement will play a critical role in ensuring the continued implementation of the Trilateral Agreement.

A number of SS-25 ICBMs have been withdrawn from Belarus to Russia, and additional SS-25 missiles are being prepared to leave the country. A number of SS-18s have been removed from silos in Kazakhstan, and the process of dismantling SS-18 silos is now beginning. All told, deactivations thus far in these three states have reduced on the order of 400 strategic warheads that were aimed at the U.S. This is just the beginning. Over the life of the program, we expect CTR assistance will support the removal of over 3,000 nuclear warheads from the territories of Ukraine, Belarus and Kazakhstan.

We are monitoring these dismantlements and deactivations through a combination of our national technical means and information gained through our rapidly increasing multiple contacts with the FSU governments, a side benefit of the CTR program. Through these contacts, I have, for example, discussed the SS-24 in technical detail with a Ukrainian general. Increasing such contacts, Secretary Perry will be visiting the SS-19 and SS-24 base on his visit to Ukraine later this month.

2) Ensure Safe and Secure Transport to Russia and Security within Russia:

Our second objective has been to make sure that warheads being shipped from other FSU states to Russia for dismantling are transported safely and securely, and that they are handled and kept securely within the country once they are inside Russian borders.

Several projects in this category have now been or will soon be completed. We have provided armored blankets to protect warheads, emergency response equipment and training, containers for warhead components, and railcar modification kits for secure transport. Transport of warheads back to Russia and within Russia has taken place without apparent diversion or incident. With many thousands of warheads yet to be transported, this U.S. assistance will continue to be used more fully in the future. As Russia is responsible for warhead movement and dismantlement, it has received most of our assistance in this area, but we are also providing emergency response equipment to Ukraine, Belarus and Kazakhstan to help them as well to guard against any nuclear accident.

In addition, we are providing substantial assistance to Russia to help it accelerate its START I reductions, joining the U.S. in the early implementation of this important treaty. We are preparing to discuss ways in which CTR assistance could be used to implement the provision of START II that foresees acceleration by two years that Treaty's reductions.

3) Promote Rapid Reduction of Russian Weapons of Mass Destruction:

Our third objective has been to encourage and assist Russia to move more rapidly to reduce its nuclear weapons and other weapons of mass destruction, in line with its START I and START II commitments and the Chemical Weapons Convention.

To help ensure and accelerate the continued dismantlement of nuclear warheads, as well as strategic systems, the US is assisting Russia with the secure storage of plutonium from dismantled warheads in Russia. We have been helping Russia to design a secure storage facility for fissile material. Combined with U.S. purchase of HEU from dismantled warheads, this project will ensure the safe disposition of the huge quantities of fissile material released from the former Soviet arsenal. The project has hit some roadblocks, but the bureaucratic logjam within the Russian Federation now seems to be breaking. Meanwhile, the January Summit between Presidents Clinton and Yeltsin produced an agreement to apply safeguards to Russian military nuclear facilities, which will contribute to our ability to track the quantities of fissile material from weapons that are being stored by Russia.

Additionally, in the past few months, after arduous negotiations, we have obtained Russian agreement to begin comprehensive planning to dispose of the 40,000 tons of chemical agents and the chemical munitions now on Russian territory. This will be a multi-year process, but in January we agreed to provide the Russians with the first step - a US contractor who will assist in planning the chemical demilitarization program with them. This will set the Russians on the road to fully implement the Chemical Weapons Convention, which they signed last year.

4) Prevent Proliferation of Nuclear Materials and Other WMD:

Our fourth objective has been to prevent proliferation through diversion of nuclear materials and other weapons of mass destruction. One direct approach to this problem is to provide assistance for the development of and improvement in export control systems in each of the four republics. We have instituted additional export control measures to prevent proliferation in Belarus, Kazakhstan and Ukraine and continue to discuss export control assistance with Russia.

We also have cooperative programs in all four FSU states to develop control and accounting systems for their nuclear facilities and materials. In addition, the U.S. is providing fissile material storage containers to safely store the plutonium from dismantled weapons.

5) Promote Defense Conversion and Demilitarization:

Our fifth objective has been to promote the transition of military bases, personnel and defense industry, particularly that which produces weapons of mass destruction, to peaceful civil purposes. Under the auspices of the Gore-Chernomyrdin Committee, the U.S. has established a U.S.-Russian Defense Conversion Commission, chaired for the U.S. by Secretary Perry. Similar Commissions are being established for Ukraine, Belarus, and Kazakhstan.

Our pilot project, for example, is in Belarus. We have underway now an integrated program which is converting the Strategic Rocket Forces (SRF) base at Lida to peaceful purposes, retraining SRF officers, and funding joint ventures between Belarus defense firms and U.S. companies to manufacture civilian products. Secretary Perry will announce the first two defense industry conversion joint ventures when he visits Minsk later this month. Additional defense conversion projects are being launched in Russia, Ukraine and Kazakhstan. By converting the economic and personnel infrastructure of the FSU weapons complex, these projects facilitate the nations' decisions to demilitarize and denuclearize.

6) Prevent Proliferation through "Brain Drain":

Sixth, our objective is to prevent proliferation through "brain drain" by assisting in the provision of alternative employment for FSU weapons scientists. Our efforts in this area have focused on the establishment of the International Science and Technology Center (ISTC) in Moscow, and a similar center in Ukraine. The ISTC Board of Directors will meet for the first time next week to approve the first round of grants to Russian scientists. These projects are expected to result in the employment of nearly seven hundred and fifty former weapons scientists in productive, non-military research activities.

7) Promote Stable Military Relations and Understanding of the Role of the Military in a Democratic Society:

Finally, our seventh objective has been to expand defense and military contacts with each of the FSU states in order to: increase understanding and promote more stable military relations; encourage support for reform and the development of military forces under civilian control which are more responsive to democratically elected officials; promote denuclearization of forces; and encourage cooperation in regional crises. These efforts help to avoid dangerous misunderstandings and to dispel the "enemy images" which characterized our relations throughout the Cold War.

Under this program several types of defense and military contacts are underway. We have funded over 116 individual events, including Bilateral Working Group meetings and Joint Staff Talks, officer, contact team, technical team, and/or sister base exchanges; and even several small, joint exercises such as the Arctic Search and Rescue exercise held with Russia.

These, then, are the seven purposes of the CTR program and examples of each. The CTR program is a "win-win" idea, for both the United States and the former Soviet states that are our partners in this enterprise. In addition to supporting our seven objectives, the CTR program is producing a number of additional benefits.

The CTR program has focused the attention of the leaders of the FSU states on the tasks of denuclearization and nonproliferation and their obligations in these areas at a time when these goals might be sidelined by urgent, domestic economic priorities. The program has captured the attention and commitment of top republic leaders. President Nazarbayev attached particular symbolism to the US commitment to assist Kazakhstan. He insisted that he sign the U.S.-Kazakhstan Umbrella Agreement personally, with no less an official than the Vice President signing for the United States. This ceremony took place in December in Almaty.

The CTR program also has given us a "seat at the table" and allowed us to help these states develop their denuclearization and nonproliferation plans and to ease the solution of problems along the way. An example is the negotiation of the U.S.- Russia-Ukraine Trilateral Agreement. The CTR program has been an effective and potent instrument in dealing with these states because it has eased the political and economic costs for them of making the tough decisions to dismantle the weapons on their territories. At the same time, our assistance motivates these states to add their own significant resources to dismantling efforts.

The CTR program has encouraged development of a post-Cold War spirit of cooperation between the U.S. and the FSU states. In addition the CTR program has provided us with a window into the FSU processes for dealing with weapons of mass destruction, lengthening the warning time we would have if events in these states took a turn for the worse.

Clearly, all parties gain through Cooperative Threat Reduction.

THE PROCESS

The CTR program is unique among our defense programs-- in its purposes and in the process used to implement the program. Because it is an unusual defense program, it is difficult for us to carry out and difficult to explain in standard Defense Program, Planning and Budgeting terms. I want to describe how this process is different in some detail because I know that this is essential to answering one of your main questions--"Why do we need more funds for this program if we have not fully obligated the funds available?"

The CTR process is initiated, as required by the legislation, with certifications that make an FSU state eligible to receive CTR assistance. Certifications for Russia, Belarus, Kazakhstan and Ukraine were submitted to Congress for 1994 in early February 1994. As you are aware, these certifications include ensuring that each state is committed to:

-- making a substantial investment of its own resources for dismantling or destroying its weapons of mass destruction;

-- foregoing any military modernization program that exceeds legitimate defense requirements and foregoing the replacement of destroyed weapons of mass destruction;

-- foregoing any use in new nuclear weapons of fissionable materials or other components of destroyed nuclear weapons;

-- facilitating U.S. verification of any weapons destruction carried out under the program;

-- complying with all relevant arms control agreements; and

-- observing internationally recognized human rights, including the protection of minorities.

There are essentially three steps in the CTR program process after making the required certifications to Congress:

1) notification;
2) negotiation; and then,
3) implementation.

The notification process, which was established in the initial FY 1992 legislation, requires that we provide a report to Congress 15 days before obligating any funds for assistance. This report is made prior to making an offer of specific assistance to any of the eligible FSU states which could result in the obligation of funds. The purpose of this requirement is to ensure that legally, the Department of Defense has the authority to use appropriated funds for projects proposed before signing any agreement to provide assistance.

In FY 1992 and 1993, we notified Congress of proposed obligations of $790 million of the $800 million transfer authority available to support the CTR programs with the four eligible FSU states. Recently, we have submitted reports on proposed obligations for the FY 1994 appropriation.

Negotiations begin after the notification of proposed obligations when we present our offer of assistance to each of the FSU states and seek to reach a common purpose and plan for the implementation of the specific assistance project.

The newly independent states with which we have been negotiating are in turmoil domestically. Internationally, they have been asserting their newly found sovereignty. As a result, their decisions about the weapons on their territories have been complex and time-consuming. Negotiations which the U.S. began with these states nearly two years ago, in some cases, have just produced results in the last few months. As you are aware, it was only in December that Ukraine signed the Umbrella Agreement and in January that the Ukrainians finally agreed to a concrete timetable for removing nuclear weapons from Ukrainian territory and accepting U.S. CTR assistance for missile dismantlement and other purposes. President Kravchuk also informed us during his recent visit to Washington that the first shipment of warheads was heading on trains to Russia.

Finally, we implement each of the specific assistance projects in coordination with the appropriate U.S. departments and agencies and the appropriate institutions within the FSU state.

One consequence of this three step process is that the pace of progress has been dependent on the recipient states, and this explains why implementation is only now beginning in earnest. Another consequence is the frustration about the lack of contracts available which I know you have heard from the U.S. private sector. At last, fortunately, the logjam has been broken.

We have signed agreements, through December 1993, committing up to $731 million for specific projects. We signed twenty-five of these agreements just since the Clinton Administration began, and most of them late in 1993. The implementation process for these agreements is just beginning.

Since the notification to Congress of proposed obligations precedes the negotiation process, however, we have had to be prepared to revise the proposed notifications, and even abandon project ideas that cannot be implemented due to lack of agreement during negotiations on the purposes and cost requirements of a specific project, or to roadblocks in the republics.

This time lag results in a build-up in the "backlog" of proposed obligations and explains the slow pace of actual obligations that has characterized this program for the past two years. However, this backlog has been essential to support our negotiations with these governments; negotiations that have yielded great success.

A good example of how the time lag to allow for negotiations has affected obligations for the program is the International Science and Technology Center in Russia. Funds were allocated to this project and a notification of proposed obligations submitted to Congress in May 1992, to allow the US to make a commitment to support Russian weapons scientists making the transition to civilian work. But after the agreement to set up the ISTC was signed with the US in November 1992, the Russian government decided that it was subject to parliamentary ratification. The parliament delayed consideration of the agreement. Only in December of 1993 was the ISTC finally brought into being, by an executive agreement with the Russian government to let the Center operate pending Duma ratification. In the meantime, except for some initial start-up administrative costs, the funds for the project were untapped for over two years.

As I mentioned, the turnaround in this project since December has been dramatic, with the first ISTC Board meeting to be held next week. So, in the end, our patience, persistence and hard work has paid off. But the time lag reflected, and thus the slow obligation of funds, is an inherent part of the CTR process.

However, based on concerns about the slow obligation of CTR funds, your Committee and its Senate counterpart decided not to carry over into FY 1994, the FY 1992 transfer authority provided for this program.

Of the $400 million initially made available in FY 1992 transfer authority, $212 million was not transferred for execution prior to the end of FY 1993, when this authority expired. Consequently, commitments contained in over 20 CTR agreements signed with the four states, which had been notified to Congress as proposed obligations, had to be met from the FY 1994 direct appropriation. Over half of the FY 1994 FSU Threat Reduction appropriation, $208 million, is being used to fulfill these US commitments. Secretary Perry re-notified Congress of these proposed obligations on February 16, 1994.

When Congress provided a direct appropriation in FY 1994, several of the bureaucratic obstacles in making funds available for CTR projects associated with the FY 1992 and FY 1993 transfer authorities, were resolved . Since the renotification, we have moved to quickly implement the on-going FY 1992 programs.

However, commitments made and programs initiated under the FY 1993 transfer authority are on hold until a reprogramming request being developed by the Department of Defense can be presented to and approved by Congress. Ultimately, without Congressional approval of this reprogramming, we could be in a position in which commitments the U.S. has made to other nations, under authority provided by Congress in FY 1992 and FY 1993, could not be met. This is not acceptable to the Administration, nor we believe, to Congress, which created the Cooperative Threat Reduction Program. We need to work together, both within the Department and with the Congress, to ensure that appropriate funds are available for this unique defense program.

To the extent that FY 1994 funds are available, we have allocated funds towards our primary goals and other urgent priorities. Of the $191 million which remains in FY 1994 funds after paying for 1992 programs, the Department has allocated $100 million for Ukraine, to be split among strategic weapons dismantlement, defense conversion, export control assistance, and assistance with developing a nuclear material, control, and accounting system. We have a great need in Ukraine to use US assistance to encourage its government to continue moving towards dismantlement. The FY 1994 funds for strategic dismantlement will be used, in part, for costs related to dismantling the SS-24 launchers and missiles.

Additionally, for FY 1994, Russia is the focus of a proposed new $20 million project to develop material control, accounting and physical protection systems for military fissile materials that are of proliferation concern. We also will continue the defense conversion program in Belarus, which has a "high tech" defense industry that presents significant opportunities for joint ventures with U.S. businesses, as well as dangers of weapons technology proliferation.

We also expect to begin a defense conversion program with Kazakhstan with up to $15 million in FY 1994 CTR assistance, fund the earmark of $10 million for additional Arctic Nuclear Waste Disposal Research, and after a few other expenses, the $191 million available for FY 1994 will be completely allocated.

Thus, despite authorizing up to $1.2 billion in funds for the Cooperative Threat Reduction program over the past three years, Congress is not getting $1.2 billion worth of purchasing power to reduce the threats to our security. To give the same kind of power to our diplomacy to deal with remaining security threats that has been so effective this past year, any new commitments the US needs to make in FY 1994 will require use of additional transfer authority.

Having the ability to make up-to a full $400 million of new commitments to CTR programs in FY 1994 is an important investment in our national security. The Department of Defense may seek to use general transfer authority during the remainder of FY 1994 for urgent, critical new projects that cannot be funded from the FY 1994 appropriation after financing the projects carried forward from FY 1992. These include possible assistance in chemical weapons disarmament and accelerated START reductions in Russia.

In FY 1995, we have requested $215 million in transfer authority to cover the FY 1994 programs we will be unable to fund as a result of the expiration of the FY 1992 transfer authority. I know that this request may present significant difficulties. We included this request recognizing that by using our FY 1994 appropriation to cover FY 1992 commitments, we could not meet the program goals anticipated in FY 1994. As we budget far in advance, this additional transfer authority may be the only way to regain the purchasing power of the lapsed $212 million.

PROGRAM IMPLEMENTATION

We have realized major successes throughout the CTR program in 1993 and early 1994, and have already begun to step up the pace of implementation. FY 1994 is clearly, as Harold Smith will explain in detail, going to be the "Year of Implementation".

Let me give you just one illustration of how the CTR program has changed and how effectively it is now working. Just three weeks ago, the Ukrainian government urgently asked our help in moving the warheads that are being removed from the SS-19 and SS-24 missiles on their territory. They requested gasoline, diesel fuel, tires, jeeps, and batteries for the convoys that are moving the warheads to the trains which will ship them to Russia. We were able to respond in a matter of days. The fuel deliveries have already begun, and many of the other supplies are now on their way to Ukraine. In this case, we have been able to facilitate the deactivation of missile systems, a step prior to dismantlement, which removes the warheads from the active inventory which threatens the US.

Additionally, I want to draw your attention to two features of CTR program implementation which I consider most important.

First, in contrast to most US Foreign Assistance programs which operate as grant aid, the US conducts this program by procuring virtually all of the material, goods and services from US companies and laboratories. This creates economic benefits for U.S. industry as well as protecting our national security.

Second, while using standard U.S. free and fair competition and contracting procedures may contribute to delays in the implementation process, this approach helps ensure that the CTR assistance provided is used for our intended purposes.

CTR PLANS FOR THE FUTURE

Do we know where we are going with the CTR program? Yes.

As encouraging as our progress in the CTR program has been, fundamental challenges lie ahead in FY 1994-95. These challenges are reflected in our FY 1994 plans and FY 1995 Budget Request. A number of key objectives stand out.

In FY 1993, we focused a great deal of our attention on Ukraine, Kazakhstan and Belarus. We will need to continue supporting the process of denuclearization in those countries, especially Ukraine. We must do our utmost to support those political forces in Ukraine who will keep denuclearization on track against domestic opposition. We cannot afford to taper off our diplomacy and assistance to Ukraine, which has not yet acceded to the Non-Proliferation Treaty as a non-nuclear weapons state. We will need to encourage and assist

Ukraine in its dismantlement program until all nuclear warheads are removed from Ukrainian territory, and considerably beyond, until all nuclear missiles and their silos are dismantled.

Some of our attention also will shift through the remainder of FY 1994 and in FY 1995 to accelerating the dismantlement process in Russia. The nuclear warheads leaving Ukraine, Kazakhstan and Belarus are, of course, being transported to Russia. The increasing number of warheads in Russia makes it urgent for the US to press the Russians to accelerate dismantling of nuclear systems. To meet its dismantlement commitments under START I and to implement START II, Russia will need to accelerate the pace of strategic systems dismantlement significantly. The U.S. will offer additional assistance for launcher and missile dismantlement and related purposes, to speed the process.

We must also continue to work with Russia to develop transparency measures for facilities in which fissile material from dismantled warheads is stored, so we may be confident that nuclear material is accurately accounted for and cannot get into dangerous hands. Ultimately, the best way to bring transparency to Russian nuclear weapons facilities is through an international regime in which the US and other states would also participate. Russia already has declared its willingness to accept IAEA safeguards at its military plants. As I mentioned, in January, Presidents Yeltsin and Clinton agreed that the two countries will cooperate to design material control, accounting and physical protection procedures for some Russian military nuclear facilities. The CTR program will provide assistance to support this cooperation.

Our assistance program gives us a window into the Russian process of dismantling and storing nuclear weapons, and the leverage to insist on transparency in the process. Through the CTR assistance program and continued diplomacy, the US will promote both accelerated and more transparent dismantling of nuclear weapons in Russia.

The US also will move forward with assistance for chemical demilitarization in Russia. We are designing a long-term program for the complete destruction of all Russian chemical stocks. As this program is developed, we expect to propose obligations over a period of several years to contribute towards Russian execution of the program plan.

To reduce the threat of proliferation presented by defense plants in the FSU, we are promoting conversion of these defense industries to civilian production. By providing small amounts of seed money to joint US-republic commercial ventures to support specific demilitarization activities, we seek to lead the US private sector towards opportunities to spin-off promising civilian technologies and businesses from the FSU's defense enterprises. Creating incentives for our private sector to get involved is high on Secretary Perry's priorities as it could ultimately be the real engine of reform in the FSU states defense sector. These efforts will be implemented as well through the Defense Demilitarization Enterprise Fund authorized by Congress in FY 1994, which is expected to be incorporated this month.

Our 1995 Budget Request carries forward these priorities:

-- First, to keep Ukraine, Belarus, and Kazakhstan on track towards denuclearization;

-- Second, to push ahead in Russia to accelerate the pace of strategic dismantlement and chemical weapons destruction;

-- Third, to accelerate the pace of construction of a secure storage facility for plutonium and other fissile material from dismantled nuclear weapons in Russia;

-- Fourth, to promote the transition of defense industry, particularly that which produces weapons of mass destruction, to civilian production.

-- Fifth, to institute additional measures to prevent proliferation, in all four republics, including ensuring that weapons scientists have opportunities for alternative employment; and

-- Sixth, to continue our efforts to expand defense and military contacts to promote transition and reform.

As our 1995 Budget submission details, we plan to allocate CTR funds among several categories which reflect these priorities. We will spend the largest proportion of funds in FY 1995 for assistance with dismantlement of strategic weapons and other weapons of mass destruction. In FY 1995, our budget request calls for an expenditure of up to $200 million on strategic offensive arms elimination among the four republics. This includes dismantlement of strategic launchers and missiles, as well as approximately $30 million for chemical demilitarization.

We plan to spend up to $60 million on safety and security of nuclear materials. This includes potential further costs for assistance with a secure storage facility for fissile material in Russia.

Up to $40 million is allocated to non-proliferation measures, including technical assistance to the four governments to improve their export control procedures and to improve the control, accounting and physical protection for fissile materials that could be used to make nuclear weapons. This program also will allow us to provide additional support to weapons scientists in the republics to make the transition to civilian work.

Defense conversion efforts also will receive additional funds--up to $60 million for all four FSU states. This will increase the capitalization of the Demilitarization Enterprise Fund being initiated in FY 1994 to support US and republic joint business ventures that convert defense industries in these states to civilian production. These funds also will support additional defense conversion projects and activities.

Defense and military contacts with the FSU states would be funded at approximately $20 million. This program is important for the development of greater understanding within the newly independent states about the appropriate role of military forces in a democratic society and the concepts of civilian leadership and management of the armed forces. These contacts also allow the U.S. to keep closely in touch with developments in military doctrine and forces in these states, to facilitate our understanding of demilitarization efforts, and to improve communication and coordination with the FSU defense establishments in areas of shared bilateral and multilateral security interests.

Other costs of the program - including logistic support for its implementation - are estimated to total below $20 million.

The amount planned to be allocated for each category reflects our objectives and prioritization of our program requirements, but as in the past, FY 1995 execution will remain dependent on conclusion of appropriate international agreements. The Department needs to retain sufficient flexibility in the appropriation to adjust these planned allocations in light of the negotiations process. In accordance with Congressional direction, the Department will provide Congress with prior notification of proposed obligations for each project as the program is further defined and implemented.

The CTR program cannot accomplish the full task in any one of the program areas for any of the FSU states. For example, in the area of chemical demilitarization alone, cost estimates for disposing of Russian CW stocks and munitions range as high as $8 billion. The FSU governments must commit their own policies and their own resources to accomplishing the bulk of these tasks. What the US can do, through constant diplomatic urging and by providing seed funding, is to draw these governments into programs through which they will ultimately allocate their own resources to accomplish these tasks themselves.

The Five Year Defense Plan includes $400 million annually to continue these programs. As I indicated, this is a small portion of what the costs to the republics will be over these years. But, the window of opportunity for the U.S. to reduce the threat from nuclear and other weapons of mass destruction which opened in FY 1992 is unlikely to remain open forever. This opportunity could pass us by if we do not continue to act decisively through the CTR program.

As the dismantlement process proceeds and the FSU states continue to make the transition to democratic institutions and market economies, we expect to phase out the Nunn-Lugar assistance program. In the meantime, these states need our encouragement, assistance, and technical expertise as they undergo this historic transformation to non-nuclear, independent countries, or in the case of Russia, to a new, more democratic power with a minimal arsenal of nuclear weapons.

We must continue to show these countries that we support their development as peaceful, democratic states for the long haul, and that we are committed not only to reducing the threat to our own security, but to supporting their independence and integration into the international community.

At the same time, we must ensure that our aid is used for the purposes intended. In this first year in which significant goods and services are being delivered to Russia, Ukraine, Belarus, and Kazakhstan, as Harold Smith will discuss in more detail, the U.S. will conduct its first "audit and examination" of the assistance provided, as we are empowered to do under the terms of the agreements we have signed with the FSU states.

CONCLUSION

1993 was an extraordinary year for the CTR program. Twenty-five agreements were signed. Allocations for assistance programs in the FSU states from the first two years' authorization of $800 million rose to $790 million. Three republics with nuclear weapons committed themselves to denuclearization.

But it was also a year in which the Russian Government reported the first documented diversion of weapons-grade nuclear material - highly enriched uranium. As long as nuclear weapons are dispersed among several republics and still deployed *en masse* in Russia, the danger to the US of nuclearization and proliferation in that region will remain. The CTR program has proven a powerful lever to diminish this threat. It is a tremendously good value for our national security dollar. We ask you to continue funding these important programs in FY 1995.

Mr. MURTHA. Dr. Smith.

SUMMARY STATEMENT OF DR. SMITH

Dr. SMITH. Mr. Chairman, Mr. McDade, Mr. Darden, thank you for inviting me here to discuss the cooperative threat reduction program.

Mr. Chairman, I face this committee with some trepidation. The first 10 years of my life were spent in Greensburg, Pennsylvania. And to the best of my memory, sir, I don't think we ever beat Johnstown.

Mr. MCDADE. You better not have.

Mr. CARTER. I am a Philadelphian, I want to say.

Dr. SMITH. For the record, Mr. Chairman, they never beat Johnstown, either.

Sir, I would like to acknowledge the farsightedness of you and Mr. McDade in establishing this program. I just hope that our management is up to the standards that you set. Part of that management is General Hagemann, sitting to my right, Director of the Defense Nuclear Agency, which is the strong right arm of this program.

Also, sir, I would like to submit my written testimony for the record.

Mr. MURTHA. Without objection.

Mr. SMITH. Thank you. The Clinton's administration's positive attitude towards CTR, in contrast to the more passive acceptance by the previous administration, has helped spark added incentive and motivation on the part of the four countries, as Dr. Carter has covered.

Also our implementation has been much more vigorous since this summer when Dr. Carter and I were sworn into office, leading to a marked, marked increase in the number of projects under way, and in the pace of the progress.

Since that time, since this summer, the level of effort represented by signed agreements and obligations made is up by a factor of five, 500 percent.

Now, actual obligations, as Dr. Carter has described, based on the agreements, necessarily take longer. My office, using preliminary analysis, indicates that the time between the issuance between an agreement and the award of a contract is approximately 12 months.

And you should ask, why is this? The Defense Nuclear Agency, General Hagemann's agency, has shown time and again that only four months is required between the issuance of an RFP and the issuance of an award. That is in marked contrast to the usual 15 to 24 months normally required in the Department of Defense for contracts of this magnitude.

The problem then does not rest with the Defense Nuclear Agency. So where is the time lost? It is lost because funds have been authorized and not appropriated. It takes time to find those funds within the Department of Defense, notify the committees, and obtain the authorization of four different committees.

Additional time is lost because we have a complicated government, necessarily, and we must coordinate our actions. But the principal delay, the overwhelming delay is caused by trying to provide American contractors to assist in dismantling weapons of mass destruction in newly created, sovereign states undergoing political and bureaucratic turmoil and growing pains.

Furthermore, in these newly independent states, major project planning, as I have been accustomed to in my private experience, and the use of contractors and particularly subcontractors can be an alien concept, and it is very difficult for them to see how we translate it into practice.

That is the reason Dr. Carter noted the uniqueness and the difficulty in implementing programs in CTR. Let me give you an example.

After I took office in June 1993, I worked personally for seven months to convince the Russians to sign a program of work that would allow the United States to provide a prime contractor to initiate planning of chemical weapons elimination in Russia, consistent with the timetables of the Chemical Weapons Convention to which Russia is a signatory.

The agreement was finally signed on the eve of the Russian Christmas, January 7, thanks in great part to Representatives Browder and Lancaster who accompanied me and joined in the final negotiations, in a marvelous display of unanimity in the Executive Branch, including our embassy in Moscow and many players here in Washington.

I attribute the slowness in getting the agreement mainly to infighting among the key Russian agencies. In addition, the Russians' desire has been for us to simply send them money, which we will not do under CTR, rather than providing U.S. contractors experienced in dismantling weapons of mass destruction. It is the turbulence of the recipients and not the lethargy of our government that has led primarily to the delays.

And I do not want to leave the impression that delay is necessary. For example, the Ukrainians require everything from gasoline to cranes to help dismantle their strategic nuclear arms on their territory. The gasoline was delivered in one week after the request, and the cranes in one month.

Now, I have focused a great deal of my attention, since assuming office, on streamlining this process and developing our own strategic planning so we can show Congress precisely what we intend to accomplish and what it will cost. The program must have an end point based on fulfillment of objectives in threat reduction. We will not ask the American taxpayer to support this effort endlessly.

There are three major thrusts under our management. The first of these, the denuclearization of Belarus, Ukraine and Kazakhstan, using our assistance and the leverage of the CTR program, has already been described by my colleague, Dr. Carter.

The second is the thrust in chemical weapons that I have already alluded to. The Russians have now agreed to approach their problem in the same way we have, using an American contractor and project planning.

We intend, with your permission and support, to assist the Russians in building a single pilot plant for destruction of their most modern air delivered nerve gas weapons using our technology and our experience to the greatest possible extent.

I anticipate this will cost $300 million or more, and that it will take approximately eight years to complete. I recognize the magnitude of the cost, but I am aware there is no cheaper way to destroy these insidious weapons that could be used against us.

The final thrust is the safe and secure dismantlement of Russian nuclear weapons. The Russians have made it very clear to us, and they have my sympathy, that they neither want nor need our help in dismantling their weapons. During the previous administration, the CTR program assisted the Russians in the safe transport and eventual storage of those weapons. We will continue that effort.

Because it relies totally, however, on good faith on the part of the Russians, we intend to augment this assistance, enhance its overall effectiveness by getting to the heart of the matter. I do not expect the Russians to change their minds simply because the Clinton administration is in being.

Their Minister of Atomic Energy, Viktor Mikhaylov, has suggested in the past, and I think we should accept his offer, that we implement reciprocal inspection of each other's nuclear dismantled warheads, that is, we should count each other's fissile material pits.

I recommend this because the Pantax facility of the U.S. Department of Energy, is implementing the technology for high-competence counting of these pits, even though they are stored in canisters and their designs cannot be revealed to the inspecting teams. Pantax management has invited me to visit the Russians to see how their technology could be employed. I intend to do so.

It will be our major thrust with regard to Russian nuclear weapons. If we cannot dismantle their weapons directly, we can assure ourselves that they have been dismantled.

These thrusts require additional expenditures using funds in the fiscal year 1995 and beyond. The actual effort will take some five to eight years. It is an opportunity not to be missed, and we should get on with it.

Mr. Chairman and Members of the committee, Mr. Visclosky, I appreciate your giving me this opportunity to discuss CTR. I will be happy to answer your questions.

Thank you very much.

[The biography and statement of Mr. Smith follows:]

HAROLD P. SMITH, JR.

As Assistant to the Secretary of Defense, Dr. Smith is responsible for the planning, modernization, security, and survivability of the nuclear stockpile. He oversees programs for chemical and biological defense, destruction of chemical weapons, acquisition of counterproliferation technology, and management of arms control treaties. The Defense Nuclear Agency and the On-Site Inspection Agency report to him. Dr. Smith also has the responsibility for implementing programs for the safe and secure dismantlement of weapons of mass destruction of the former Soviet Union. In addition, Dr. Smith chairs the NATO Senior Weapons Level Protection Group that ensures the security and survivability of NATO tactical nuclear deterrent and advises alliance ministers on matters of nuclear protection.

Dr. Smith was the president of the Palmer Smith Corporation, a consulting firm that specializes in the management of high technology programs for aerospace and defense contractors. Dr. Smith was also a founder and director of Swerling, Manasse & Smith, Inc., a Los Angeles firm that analyzes recent advances in radar systems.

Since 1968, Dr. Smith has served as a consultant and advisor to the Office of the Secretary of Defense, the Office of the Secretary of the Air Force, and the Armed Services Committees of the U.S. Senate and the U.S. House of Representatives. He has advised on matters of national security policy, giving particular emphasis to projects requiring a broad range of technical and managerial skills. As a member of the Air Force Scientific Advisory Board, he has chaired the Tactical Advisory Panel and has directed studies ranging from improved operational testing of complex weapon systems to development of modern munitions. For the Defense Science Board, he has chaired task forces concentrating on the vulnerability of strategic systems. He has been a member of the Defense Sciences Advisory Board for the Lawrence Livermore National Laboratory and the Heinz/Wirth Task Force on Defense Spending, the Economy, and the Nation's Security.

From 1960-1976, Dr. Smith was a member of the faculty of the University of California and published over 50 papers on the optimal control of exotic nuclear systems and on the interaction of radiation with surfaces. For his sabbatical year in 1966, Dr. Smith was awarded a White House Fellowship and was assigned as a Special Assistant to the Secretary of Defense.

Dr. Smith received all his degrees from the Massachusetts Institute of Technology: a Bachelor of Science in Mechanical Engineering in 1957, a Master of Science in Nuclear Engineering in 1958, and a Ph.D. in Nuclear Engineering in 1960. He held a Sloan National Scholarship as an undergraduate and a Nuclear Technology Fellowship as a graduate student. Dr. Smith was an honor initiate of Tau Beta Pi and a member of Sigma Xi.

Dr. Smith is a Fellow of the American Physical Society and has twice received the Exceptional Civilian Service Award of the Air Force and the Commendation of the Secretary of the Navy. He has been a member of the National Academy of Science Committee on Undersea Warfare and has served on the editorial board of the Journal of Defense Research. He is a senior member of the Institute of Electrical and Electronics Engineers. In addition to technical papers, he has published articles of public interest, related to national security, in The New York Times and the Christian Science Monitor.

Dr. Smith was born in Greensburg, Pennsylvania, in 1935. He and his wife, the former Marian Bamford, and their three children have resided in California since 1960.

FINAL

STATEMENT BY

DR. HAROLD P. SMITH, JR.

ASSISTANT TO THE SECRETARY OF DEFENSE

(ATOMIC ENERGY)

BEFORE THE

HOUSE APPROPRIATIONS COMMITTEE

SUBCOMMITTEE ON DEFENSE

HOUSE OF REPRESENTATIVES

SECOND SESSION, 103RD CONGRESS

COOPERATIVE THREAT REDUCTION HEARING

MARCH 9, 1994

INTRODUCTION

Mr. Chairman, members of the Committee, I am pleased to have this opportunity to discuss with you today our efforts and progress in implementing the Cooperative Threat Reduction/Nunn-Lugar program to assist Russia, Belarus, Ukraine, and Kazakhstan in the elimination of the former Soviet Union's weapons of mass destruction and the prevention of weapons proliferation. I believe the Cooperative Threat Reduction, or CTR, program can take great credit thus far in reducing the nuclear weapons threat that resulted from the breakup of the Soviet Union and continuing instabilities in the former Soviet Union, and in helping to ensure a safer and more stable world order in the future.

The Administration considers the spread of weapons of mass destruction and of related nuclear materials and know-how to be one of the most serious threats to U.S. national security interests in the post-Cold War period. Our execution of the CTR program is one of the pivotal ways by which we are meeting this threat, as well as the other dangers associated with the breakup of the Soviet Union.

The CTR program is playing a necessary role in the complete and timely denuclearization of Belarus, Ukraine, and Kazakhstan. Additionally, the program is critical to the Russian Federation's ability to meet and accelerate fulfillment of its obligations under the Strategic Arms Reduction Treaties (START) and the Chemical Weapons Convention (CWC) and to ensure safety and security in the dismantlement of its thousands of nuclear warheads. In short, the CTR program is accomplishing what its name entails: It is reducing the threat, and it is doing so through implementation in a steady, constructive, and economical manner.

During our session today, I will describe our progress thus far in implementing the CTR program, our vision concerning where we go from here, and how we are fulfilling the vital objectives established by Congress in 1991 and reaffirmed since by Congress and this Administration. I am proud to tell you that as we speak right now, equipment supplied by the United States under the CTR program is being used in and by the recipient countries on various individual projects to fulfill the program's objectives. In other cases, equipment is being procured under CTR, and within a few weeks, additional equipment for assisting the dismantlement of strategic missiles in Ukraine will have arrived in that country.

The program, as a whole, consists of over 30 projects which have resulted from negotiations and agreements between the United States and the four recipient countries. These projects have been proposed and approved by Congress and address the following key thrust areas: strategic offensive arms elimination in Russia, Belarus, Ukraine, and Kazakhstan; safety and security of nuclear weapons; chemical demilitarization in Russia; defense conversion; nonproliferation; and CTR support efforts that do not fall neatly into the above categories but contribute importantly to the program's progress and goals.

BACKGROUND

I believe it is important for us to remain mindful of the events and conditions that led to the initiation of this program two and a half years ago, because these conditions largely exist today, and the clock is still ticking. Congress decided in late 1991 that the following types of danger to nuclear safety and stability existed in the rapidly disintegrating Soviet Union and that the Soviet successor entities would require assistance to address them:
(1) ultimate disposition of nuclear weapons that would not be favorable for nuclear weapons safety or international stability; (2) the possibility of seizure, theft, sale, or use of nuclear weapons or components; and (3) transfer of weapons, weapon components, or weapon know-how, contributing to worldwide proliferation outside of the territory of the former Soviet Union.

In light of these identified risks, Congress established a set of objectives that continue to guide the program. These objectives affirm the U.S. intention to provide assistance to the former Soviet Union for implementing and facilitating: (1) the destruction of nuclear, chemical, and other weapons; (2) the safe and secure transport, storage, and safeguarding of weapons in connection with their destruction; and (3) the prevention of proliferation of weapons, materials, technology, and know-how from the former Soviet Union.

Fulfillment of these objectives within the CTR program, in turn, has become essential to other efforts critical to U.S. national interests. These include the Russian ability to meet START and CWC reduction schedules; the complete denuclearization of Belarus, Ukraine, and Kazakhstan and these countries' corresponding ability to meet their START and Nuclear Non-Proliferation Treaty (NPT) obligations; and efforts (such as defense conversion and defense-and-military contacts) that will have profound, lasting, positive effects on the infrastructures in the recipient countries, toward the building of democracies and market economies. The Administration is committed to meeting all of these objectives and programs and has given CTR the highest-level attention and interest.

Although Cooperative Threat Reduction began ostensibly as a one-year program under the original Nunn-Lugar legislation, it has expanded into a continuing effort because of the longer-term and more complex nature of the tasks we need to complete. Even for the United States, with our relatively robust economy and high level of technical and manufacturing capability, the dismantling of a major part of our Cold War stockpile and the meeting of treaty timetables is a prodigious and costly endeavor that will take us into the next century. For the new independent states of the former Soviet Union, the relative burden and effort required are even greater. As I will discuss below, we have a vision encompassing this continuing effort and a corresponding plan for implementing it.

It has taken about two years for the mutual trust between the U.S. and former adversaries in the new independent states of the former Soviet Union to develop to the point where it is now, based on an ongoing record of demonstrated sincerity and progress. As recently as just a few months ago, there were 18 CTR projects underway with the four recipient states; today there are over 30. The CTR program has also become intertwined with our arms control and counterproliferation objectives and initiatives, as well as even broader interests, in serving our national security.

To date, $400 million has been authorized for the CTR program in each of the Fiscal Years 1992, 1993, and 1994. Of that amount, Congress has been notified of over $900 million to be spent in support of a wide range of CTR projects in the four recipient states.

THE PROGRAM'S VISION

Our implementation of the Cooperative Threat Reduction program is guided by detailed planning, with a clear vision of CTR's directions in currently programmed areas with a defined end point. This vision for the overall Cooperative Threat Reduction program is best exemplified by how we have approached the CTR project for assisting in the demilitarization and destruction of Russia's chemical weapons (CW) stockpiles, and this CW destruction project serves as a microcosm of and model for how we would like to conduct the other parts of CTR.

In the CW destruction project, we have a comprehensive plan and approach that addresses the chemical weapons life cycle from its current stage--storage--all the way to destruction and final disposition, or neutralization, of the munitions and materials. Our assistance to Russia in the CW area extends to potentially helping with the actual building of a nerve agent munitions destruction facility, and we have a clear conception of the future end-game and desired end-point of the program.

In the nuclear areas of CTR, too, our planning considers the final fulfillment of our objectives, the meeting of related (such as START) timetables, and how we and the former

Soviet states want things to look in the final analysis in terms of denuclearization, safety and security of stored fissile materials, and nonproliferation.

Our planning and vision with respect to the nuclear-related elements of CTR consider the entire weapon life cycle and associated measures for ensuring that the chain of custody remains intact and, accordingly, that warheads and materials remain safeguarded and their disposition accountable. CTR projects currently underway address the entire chain of custody, and we have conducted discussions with the Russian Federation on how to enhance the transparency of warhead storage, transportation, and dismantlement by means of mutually acceptable techniques for monitoring and accounting.

We will continue to engage the Russians in this sensitive area, to provide confidence that warheads are, in fact, being dismantled and to enhance the means for physical security by deterring, preventing, or detecting diversions of warheads or materials. The Clinton Administration has taken an unprecedented step in determining unilaterally that excess U.S. fissile materials will be brought under the monitoring program of the International Atomic Energy Agency. This, we hope, provides an incentive for the Russian Federation to do likewise in enhancing the transparency of its nuclear materials cycle and of its weapons dismantlement efforts. We have developed concepts for monitoring and auditing the warhead dismantlement and fissile materials disposition processes without revealing sensitive warhead design features, and we will continue to press for Russia's acceptance and implementation of such measures within CTR. Each agreement also includes provisions for audit and examination, which the United States will exercise at appropriate times to determine whether the equipment supplied under the agreement is being used for its intended purpose.

In addition, as I will discuss below, our vision also considers the synergism and future convergence of projects (for instance, HEU purchase, plutonium storage, and strategic offensive arms elimination) as forming, together, a coherent picture of nuclear warhead safety, security, and dismantlement. No one project stands alone in our thinking and planning, and we use a comprehensive systems approach in working toward and measuring progress toward satisfying the program's threat reduction objectives.

Our vision looks to a future in which the economic and social infrastructures in the former Soviet states are transformed into productive and stable entities. Through the CTR defense conversion projects, we are assisting in the transformation of defense-industrial complexes into enterprises that will produce civilian goods on a profitable, self-sustaining, and long-term basis, thus contributing to both demilitarization and economic stabilization in these states. As a key aspect of our defense conversion projects, the engineering, managerial, and work forces will learn new skills and orientations, thus giving CTR's effects in reducing the threat even greater constancy and value.

Finally, and most importantly, our vision and the associated planning look ahead to a successful end to the program, when the requisite weapons dismantlement and safe storage objectives will have been met completely by the end of this century. Measures for monitoring and safeguarding the chain of custody of remaining warheads and materials in Russia, as described above, will require continuing maintenance beyond that time frame, but at a relatively modest cost with a hugely effective return in terms of our national security. In the defense conversion area, our plans for helping the profound transformation of former Soviet economic infrastructures into peaceful and productive assets include a rapid infusion of assistance to selected enterprises and sectors, followed by investment by Western firms through a Demilitarization Enterprise Fund and, finally, self-maintenance that will permit CTR funding disengagement.

Our vision for the implementation of the CTR program is coherent and complete, and we are working toward the final and lasting fulfillment of ambitious but achievable objectives.

THE PROGRAM'S ACHIEVEMENTS

I would like to highlight the CTR program's accomplishments in meeting the Administration and Congress's threat reduction objectives and provide some examples of the program's progress and impact to date. First I will discuss our assistance to the recipient states in the related thrust areas of strategic offensive arms elimination and safety, security, and storage of nuclear weapons. These areas address many of the major concerns that led to the original Nunn-Lugar legislation in 1991 and the initial Safety, Security, and Dismantlement (or SSD) program.

The Russian Federation has not requested and has even rejected offers for direct assistance in the actual dismantlement and destruction of nuclear warheads. Nonetheless, the ongoing CTR projects in both the strategic offensive arms elimination and the nuclear warhead safety and security areas, when considered together in a complementary and coherent program as we are doing, have a distinct effect in reducing the threat tantamount to direct involvement in or monitoring of dismantlement. We are undertaking projects and an integrated approach that enable us to make assessments about the progress of the program in real-world terms of threat reduction.

We are prepared to offer the Russian Federation assistance in instituting measures for non-intrusive monitoring of the chain of custody of nuclear warheads and the fissile materials removed from them. This will permit even more confident assessments of the progress of safe and secure dismantlement. Measures of this type will not only ameliorate our concerns but will also enable the Russians to have better accounting and physical security over the weapons and materials. In light of the political and social turmoil and instabilities in Russia, this will benefit not only them but us as well.

The CTR program has had tangible results in reducing the threats to U.S. security emanating from the breakup of the Soviet Union. In the immediate wake of the Nunn-Lugar legislation, officials of the Commonwealth of Independent States gained confidence as a result of the newly emergent U.S. cooperative assistance program to return to Russia from the other republics the tactical nuclear warheads identified in the fall 1991 unilateral declarations. It is apparent that CTR gave them this confidence by offering the promise, now being delivered, of equipment and training enabling them to deal safely and securely with the severely increased warhead transportation and storage demands. In the area of eliminating strategic offensive arms, our assistance under CTR has had a comparable impact in providing the confidence and additional material means for accelerating the weapon system dismantlement and elimination process.

We are providing Belarus, Ukraine, and Kazakhstan with the equipment and training necessary for ridding them of all strategic nuclear armaments on their territories, so they can comply with the terms of START, the Nuclear Non-Proliferation Treaty, and other international obligations. In addition, we are providing assistance to the Russian Federation to help it accelerate the reductions required under the START treaties. For example, we are supplying Russia with cranes, bulldozers, and various tools to eliminate missile silos; incinerators, intermodal tank containers, railroad flatcars, and heavy cranes for rocket propellant elimination; cutting equipment for destroying submarine missile launchers; and cranes, vehicles, and tools for eliminating strategic bombers. Ukraine is receiving similar types of equipment for dismantling ICBMs and ICBM silo launchers and for eliminating rocket propellant. Training in the use and maintenance of the equipment is provided as part of the assistance.

Russia has begun to dismantle its own missile silos already, using its own equipment in anticipation of receiving equipment we are providing under CTR. This is in compliance with START, even in anticipation of START's entry into force. Without our CTR assistance in this area, these countries' abilities to comply with the schedules for eliminating these weapons would be in grave doubt, by their own admission.

By the end of the year 2000, CTR will have supported or assisted the reduction of a large number of strategic weapon systems under the START I and II treaties, amounting to an overall reduction of deployed strategic warheads by over 7900. Specifically, CTR projects are supporting the elimination of 896 ICBM silos, 33 rail-mobile launchers, 552 SLBM (submarine-launched ballistic missile) launchers, 39 SSBNs (strategic missile-carrying submarines), and 115 heavy bombers, as well as the conversion of 90 SS-18 ICBM silos to house small, single-warhead missiles instead of the destabilizing, multi-warhead systems currently deployed in those silos.

The CTR program established an atmosphere of cooperation and helped give Ukraine a needed incentive to enter into the Tripartite Agreement recently signed by Presidents Clinton, Kravchuk, and Yeltsin for Ukraine's complete denuclearization. Equipment we are providing for Ukraine's denuclearization under CTR is being put to use there to assist in removing all of the warheads from the 46 SS-24 ICBMs on Ukrainian territory under this Agreement; CTR will continue to provide the necessary equipment for seeing it through to completion. We also are procuring and will soon ship equipment to Ukraine for elimination of the 130 SS-19 ICBMs located on its territory. Belarus, in which SS-25 road-mobile ICBMs are based, is another case in which CTR-created incentives helped to stimulate denuclearization by the recipient. Prospective CTR assistance for restoring the SS-25 sites and transforming them to productive use, as well as for housing and retraining the associated military personnel, provided the principal incentive for the Belarusan government to agree to and begin the process of returning the missiles to Russia.

Similarly, in the case of Kazakhstan, CTR efforts will assist the elimination of all SS-18 ICBM silos and launch control facilities in a safe manner to enable Kazakhstan's fulfillment of its START obligations and its pledges to become a non-nuclear weapons state under the Nuclear Non-Proliferation Treaty. As a model for future efforts of this type, we expect to use an integrating contractor to undertake planning and implementation of the many tasks that comprise the process of Kazakhstani silo dismantlement.

Our efforts under CTR in ensuring the safety and security of nuclear weapons transport and storage in Russia add further to the threat reduction picture. The key bottleneck to progress in warhead dismantlement, according to Russian officials, has been the lack of containers for safely transporting and storing fissile materials removed from dismantled warheads. We will supply Russia with up to 10,000 containers (and potentially more), under the existing bilateral agreement, for safe transport of these materials to storage facilities and for long-term storage in the facilities. Prototype containers have been manufactured in the United States and shipped to Russia, and in a few months we will begin shipment of the actual storage containers.

Additionally, we are assisting Russia in designing and supplying equipment for construction of a facility for long-term storage of the materials in these containers. Russian officials have made it known that their eventual needs will exceed the currently agreed upon quantities of containers and the one storage site for which we are providing CTR assistance. Our continued and potentially expanded help in these areas will enhance the likelihood that Russia will be able to dismantle its nuclear warheads and to reduce its strategic inventory to agreed START II levels according to the timetables of both START I and START II. Without our assistance under CTR, meeting these levels and timetables appears impossible.

The United States is purchasing from Russia, at no cost to the U.S. taxpayer, 500 metric tons of highly enriched uranium (HEU) from dismantled warheads, for blending down to civil grade power plant fuel. When this HEU purchase and the above-described CTR plutonium storage facility and container projects are taken together, they comprise efforts to remove and account for a major portion of the materials removed from warheads dismantled in Russia. Although we are not assisting in direct warhead dismantlement, we are providing the assistance that enables dismantlement to proceed more quickly than it would otherwise and gives us a means of accounting for this progress.

Therefore, we can see dramatic results from CTR in reducing the nuclear threat from the former Soviet Union, when we consider the various projects as complementary and as contributing to a larger picture, even though we are not involved currently in direct assistance to or monitoring of warhead dismantlement. We are responding quickly to take advantage of windows of opportunity in U.S. mutual relations with the recipient countries, relations among these countries, their various domestic political and economic situations, and the timetables for treaty compliance.

As I noted above, CTR is instrumental in Russia's eliminating its chemical weapons stocks once and for all. The Chemical Demilitarization portion of CTR is envisaged as a comprehensive, start-to-finish project, a microcosm of the overall CTR program and a virtual model for it.

When the Soviet Union dissolved at the end of 1991, approximately 40 percent of its economy was dedicated to defense work, employing some of the best and the brightest among the country's work force. As the countries that comprised the Soviet Union attempted to transition to a commercial economy, they found the challenge overwhelming. The defense conversion thrust in CTR with Russia, Belarus, Ukraine, and Kazakhstan is an investment in a demilitarized, peaceful and productive future for those new independent countries.

Like the CTR thrust areas described above, defense conversion contributes to the goals of the Cooperative Threat Reduction program by helping to reduce the threat. Although the impact may not be as dramatic or direct as the removal of a missile from a silo or the containerization and secure storage of weapon-grade nuclear material, the long-run consequences are similar and can be even more profound in terms of building a safe and stable future for the United States and the world.

We recognize that the modest amount of money allocated for this area could never fund all the needs of the four recipient countries; that is not our intent. Rather, this is seed money to foster further investments, to create ripple effects in the economies, and, as an indirect benefit, to provide incentives for the recipient countries' continued path toward denuclearization. We also recognize that the needs of the four countries are different, and we allow for these differences and the respective goals in the way we plan and implement defense conversion. Our plan, as I noted above, is to fund incentives for private investment and then to let the private sector proceed from there. The CTR defense conversion effort works in concert with the interagency Defense Conversion Commission chaired by Secretary Perry which, in turn, interacts with the World Bank, the Export-Import Bank, the Overseas Private Investment Corporation, and other investment leaders.

In general, the defense conversion efforts under CTR are directed toward industry conversion and housing and retraining for demobilized former Soviet military personnel. The response from U.S. industry to our requests for proposals has been extremely enthusiastic, indicating the intense interest among U.S. firms to become engaged in these countries when given the support from the U.S. Government and the opportunity to work on clearly defined endeavors. A defense conversion project we are undertaking in Belarus, to install a computer training center at the former Soviet missile base at Lida to retrain former Strategic Rocket Forces personnel, is exemplary of CTR's defense conversion initiatives. This computer training center, set up by a U.S. contractor, will be operational next month, and the first class of about 30 students has already enrolled. Many more projects of this type will be underway within the next few months. In short, defense conversion is defense by other means in terms of U.S. security interests.

In addition, CTR is promoting U.S. nonproliferation objectives through establishment of science and technology centers in Moscow and Kiev to employ Russian and Ukrainian weapon scientists in productive civilian endeavors. These will help prevent a potential brain drain from contributing to the global proliferation problem and, at the same time, is an investment in a demilitarized future for former Soviet science.

One additional area bears mentioning, and that is the CTR support effort. The support effort will provide a single, in-country point of contact for integrating and coordinating CTR-related tasks; a capability for planning and monitoring the transportation of items provided under CTR to their point of use; and a means for providing maintenance, spare parts, and repair to ensure that the equipment provided is available for its intended, agreed use. The Defense Nuclear Agency (DNA), which is our executing agency for CTR, has had a major role in setting up this initiative. The On-Site Inspection Agency (OSIA), which maintains personnel within the recipient countries, will play a major part in its implementation.

The CTR program also has developed an audit and examination (or A&E) process in accordance with the implementing agreements that have been signed between the U.S. and recipient governments for each CTR project. This will enable us to monitor, through the audit and examination process, that the U.S. assistance provided is being used for the purposes intended under the agreement and in accordance with U.S. policy and law. Together with the CTR support process, A&E helps to guarantee that the U.S. taxpayer is getting the expected return on his or her dollars in terms of cooperative threat reduction.

In summing up CTR's achievements, as described briefly above, I want to reiterate that our planning for CTR and our ongoing assessments of the program's impact consider the complementary nature of the projects in achieving threat reduction. The program began little more than two years ago, and already we are seeing results in terms of the actions of the recipient countries, at their own initiative, in dismantling the dangerous nuclear forces that have confronted us for several decades. The Clinton Administration's positive and supportive attitude toward CTR, has helped spark added incentive and motivation on the part of the recipients. Additionally, our implementation of CTR has become more vigorous since I took office on June 1 of last year, leading to a marked increase in the number of projects underway and in the pace of progress. Our active cooperative assistance appears to have a magnifying effect by giving these countries the confidence to use their own resources in concert with ours in accomplishing the necessary tasks, sometimes in anticipation of the actual assistance.

Implementation has begun slowly in some areas, because of difficulty in agreeing on specific requirements with our bilateral partners and then in defining the requirements with these partners for accomplishing a certain set of tasks so the U.S. Government could solicit competitive bids from U.S. industry. The countries receiving CTR assistance are still turbulent politically, and their respective bureaucracies have not yet completely sorted out the optimal divisions of labor or ways of operating efficiently in a post-Soviet environment.

For example, although an agreement was signed in September 1993 between the U.S. and Russian governments for the provision of equipment for a long-term storage facility for fissile materials from dismantled weapons, the Russians--despite constant prodding by the United States--failed until January 1994 to deliver the list of required equipment. As a result, we were unable to issue requests for proposals (RFPs) for U.S. businesses to procure and ship the necessary items in time for a spring/summer construction start on the facility. It is worth noting our experience that once an RFP has been issued, the Defense Nuclear Agency is able to award a contract within 120 days.

We have begun to move toward use of integrating contractors within projects, such as in the case of Kazakhstan, and this will expedite the process of defining requirements and procuring the equipment needed to satisfy them, as well as capitalizing on the expertise of U.S. industry. In all, the process is moving smoothly under the program management and execution of DNA and the assistance of OSIA and other DoD components and U.S. departments and agencies.

CONCLUSION

The CTR program has made tremendous strides in reducing the threats that attended the breakup of the Soviet Union and the breakdown of economic, social, and political stability in the successor states. As noted above, the program is meeting the objectives established by Congress in 1991 and reaffirmed repeatedly since then by Congress and this Administration.

This Administration is committed to the Cooperative Threat Reduction program and to the farther-reaching national security goals whose fulfillment depends on continuation of the program. As I have indicated, our planning is done with a clear vision of how the various projects fit together to fulfill the program's objectives and of how we will disengage when the objectives have been met at the end of this century. When CTR is viewed as a whole, its impact on reducing warheads, delivery systems, proliferation risks, and even future risks and threats is clearly evident.

Thank you for giving me this opportunity today to discuss Cooperative Threat Reduction with you, and I will be happy to answer your questions.

FOCUS OF PROGRAM

Mr. MURTHA. I appreciate the good report about a program which, when you look back, those who weren't involved tend to forget, was difficult to get through Congress. I remember the reason that we narrowed it down with language. I was just looking at the language we wrote in the 1992 supplemental. The first part DoD asked for and the second part Mr. McDade and Mr. Stevens and Sen. Inouye and myself believed necessary to make sure that Congress was assured that this was a narrow program for demilitarizing nuclear weapons.

At the time there was a big push just to put a billion dollars in for humanitarian, quote, assistance, unquote. We felt that in the first place there weren't the best feelings right after the Cold War. In addition to that, we needed a very narrow mandate for the agencies to understand what we expected them to do with the money.

And I am surprised it is taking so long to get the money obligated. I know last year we didn't extend the 1992 transfer authority. I don't think there is anything more important we can do than reduce the threat to the United States by removing nuclear warheads.

When I think of the damage done by the one bomb, the World Trade Center, which was a few hundred pounds of TNT, versus a nuclear weapon, this program is really good news for us. We appreciate the way you handled it, your diligence and perseverance. The fact that we played a part in it is gratifying.

With so many programs we don't see the result, because they do take a long time. It is gratifying to have you come before the Committee and say that something that we have worked out very carefully has been of advantage to the security of the United States.

Mr. McDade.

DEFENSE CONVERSION

Mr. MCDADE. Mr. Chairman, thank you very much, and thank you both for your statements.

I want to reiterate the Chairman's statement that this is an area of deep mutual concern to us and one where we want to get along. When we did this, as the Chairman has indicated in noting the link that was in the original legislation, we were directing a very specifically oriented program. And I have to inquire into that a little bit, because there are some things in the budget we have to get square.

For example, the words defense conversion keep reappearing in your testimony. When you look at the amount that is budgeted, $2 billion over the five-year period, it looks as though there is about $500 million that you are thinking about possibly allocating toward defense conversion. Is that an accurate amount?

Mr. CARTER. I think, Mr. McDade, that is a little bit more than we have planned for defense conversion. We don't anticipate defense conversion taking up that amount of money. I will add it up right now, if you want.

It is between 200 and 250, if memory serves. I will get the precise number for the record.

[The information follows:]

The funds budgeted for defense conversion in FY93 and FY94 total $145 million, including the Defense Enterprise Fund.

Mr. CARTER. If I may, your point is well taken, which is that the purpose of this program is demilitarization. So how do we reconcile defense conversion with that, and if I may, let me make a few points there.

The first is that our defense conversion effort is small and will remain small. It is never intended to do anything more than be a catalyst or a stimulus for the creation of joint ventures between the U.S. private sector and privatized spinoffs of former Soviet defense industries, that we hope will have the joint effect of creating good business opportunity for U.S. businesses and also shrinking and reorienting to peaceful purposes the overlarge defense industries of the former Soviet Union.

Mr. MCDADE. Last year, we took about a billion dollars out of the Defense Department's budget into the foreign aid package to enable the $2 billion Presidential request to go forward. It was a billion dollars that was agreed to by the Chairman of this committee, the Members of this committee, put into the foreign aid package for the Soviet Union.

What is troublesome is that when we begin to see elasticity creeping in, we don't know where it starts and stops. We hear 250 million dollars or a number like that which is a considerable sum in this declining budget, and as much as we want to stimulate U.S. enterprises, it sounds a bit more appropriate if it would be in the AID budget or in the Commerce Department budget or some other part of the budget.

Dr. SMITH. Let me respond to that, Mr. McDade. We are interested in weapons of mass destruction, so the entire defense conversion plan that we have evolved is aimed only at those institutions in the four republics, particularly Russia, that are closely related to many aspects of WMD, weapons of mass destruction.

The AID program, which you mentioned, is happy to convert any defense industry. This program is aimed at the nefarious weapons of mass destruction. The same can be said of our housing effort, where again——

Mr. MCDADE. But, Doctor, the problem becomes, we narrow an area, we say in the language we don't want to extend this as a Defense Department function to humanitarian efforts. Your justification includes an organization called the Defense Conversion Enterprise Fund, to be run by a private board of directors, apparently housed someplace in the Department of Defense. Is that your concept of where it would be?

Dr. SMITH. No, sir. The idea behind the enterprise fund is that we want to move quickly while the window is open. Therefore, our defense conversion program is aimed at quickly getting U.S. business involved in joint ventures with manufacturers of weapons of mass destruction in the four republics, and we do this, but we don't want to continue asking for your support. We want——

Mr. MCDADE. What is the private board of directors? How many are they going to be? Where they going to hang their hats? What are they supposed to do?

Dr. SMITH. What we want to do is create a fund which will make investments out of that fund and on which there will be a return.

Mr. McDade. Are you talking about using appropriated DOD dollars to make the fund?

Dr. Smith. On the initial startup, that is correct.

Mr. McDade. Is this the $250 million we are talking about?

Mr. Carter. No, it is only a fraction of the $250 million. The purpose of the directors is to make sure that the decisions about how these funds are applied to stimulate the creation of joint ventures between U.S. business and weapons of mass destruction related businesses on the Russian side are made by people with business acumen and not by bureaucrats.

We are initiating some projects where we have actually selected the partners. We don't think we are the best equipped to select the partners, for all the glories of public servants, their knowledge of private sector operating is probably not their strength.

And the intention of the enterprise fund is specifically to get some business acumen into these decisions.

National Academy of Sciences

Mr. McDade. Whether or not it is appropriate use of the shrinking defense dollar remains a question with me. I appreciate your answers, and we are all on the same score sheet in terms of trying to get at those weapons of mass destruction. Whether or not we are going to see it carried to the point where we get into a defense conversion fund usage remains to be seen.

And whether or not we permit a seed fund to be established with a private board of directors obligating DOD money is also a question. I hear what you say about the private sector, but we put authority into use, National Academy of Sciences, National Academy of Engineering, I think you said we could have as much as $10 million in transfer authority. Have we used that money?

Dr. Smith. Yes, sir. Dr. Birely, who is immediately behind me, is the deputy for our office for all CTR. Dr. Birely is actively negotiating with the National Academy to see how best to use the prestige and skill of the National Academy.

Mr. McDade. They have a long history of cooperation with the Soviet Union, I think.

Dr. Smith. As you know, the title—academician—in Russian means an awful lot. The members of our academy are truly prestigious, but they are perceived to be doubly so in Russia.

Management of projects is not what I would give to the National Academy. Since I do come from business, I have a fairly good idea of what are the marks in good business and what aren't.

But the academy can be of enormous help to us in many, many ways, not the least of which is their prestige. We intend to use that money up to $10 million, but we don't guarantee we will use the entire $10 million, to bring into the program the best talents of the academy.

Weapons Modernization and Production

Mr. McDade. We will take a look at that and continue a dialogue with you as we continue to go along with this program, whether or not we want that elasticity.

Are any of the former Soviet states producing new nuclear weapons or modernizing old ones?

Mr. CARTER. Ukraine, Kazakhstan and Belarus have no facilities for producing nuclear weapons. Only Russia contains facilities for producing nuclear weapons. Like us, they dismantle nuclear weapons in the same facilities that they make new nuclear weapons in.

Our understanding, which we think is pretty good, of what is going on in those facilities tells us that they are dismantling a couple of thousand nuclear weapons per year. Some of these are the strategic weapons coming back to Russia from Ukraine, Kazakhstan and Belarus. Some are tactical nuclear weapons removed in previous years.

Now, Russia, under the START agreements, will continue in the future to have a nuclear arsenal. The other countries will not. They have signed up to getting rid of all their nuclear weapons and we——

Mr. MCDADE. Apart from Russia, there is no production going on of any kind?

Mr. CARTER. No.

Mr. MCDADE. In fact, there is a dismantling occurring, a gathering up of tactical weapons and a taking down of strategic?

Mr. CARTER. Yes.

Mr. MCDADE. That is wonderful news. You did say the Russians are making them?

Mr. CARTER. I was about to get to that fact. Russia of course has facilities, and they will in the future have nuclear weapons under the START agreement. And they may fabricate, according to the START agreements, nuclear weapons to deploy in the future.

We have insisted, however, that we not assist them in any way in that enterprise, and furthermore that any time we assist them in the transport or elimination of weapons, that we be sure——

Mr. MCDADE. Let me ask you a question. That is in contrast to our posture on the nuclear program. We have taken ours down, we are not producing new weapons. They are producing new and modernizing?

Mr. CARTER. They have the right under the START agreement to produce——

Mr. MCDADE. I didn't ask if they have the right. I asked if they are.

Mr. CARTER. We don't know whether they are.

Mr. MCDADE. Are we in conversation with them about taking that part of the program down? I am sure we are.

Mr. CARTER. Absolutely. Harold, do you want to discuss the nuclear weapons dismantlement aspects?

Dr. SMITH. Yes, sir, I have already covered that. While they won't allow us to dismantle them, they welcome our assistance in the safe transport and eventually in the counting of them.

I also would like to point out that while it is true that we are not manufacturing new weapons, I am somewhat sympathetic to the Russian desire to perhaps make new weapons that are safer, more reliable, all within the treaties that they have agreed to by their executive and anticipate will be ratified.

As long as they stay within the treaties and do not use the material from the dismantled weapons, I don't think that we need to press too hard. Although Dr. Carter is right, we are in constant discussion on these points with them.

Mr. McDADE. I would think we ought to be. The START agreement was a milestone, of course, the restrictions that the countries agreed to. That is not to be the end game. I would hope that we are still pursuing the question of where we get to in terms of no production.

Dr. SMITH. There is no question that is the end point we are trying to achieve.

Mr. CARTER. One example is our deal with highly enriched uranium with the Russians, where we have told them we will not buy from them material unless we are sure it has come from dismantled weapons.

Another concerns the plutonium production process in Russia. Almost all of the plutonium-producing reactors have been shut down except for three, which they say they want to shut down but which are also used for heating in the local communities.

So we have discussed with them—and Representative Markey has been instrumental in thinking through possible solutions to this problem—we have been discussing with them assisting them in replacing those power plants with nonnuclear power plants so they will never produce any more plutonium.

So we are working at narrowing down their nuclear weapons fabrication and production complex. And that is a target of our future program, and one of the thrusts of our future program, to get at that nuclear weapons production complex.

Mr. McDADE. We just want to make sure we haven't got a big hole in that, as you know, to go back to the football analogy.

Thank you, Mr. Chairman.

Mr. MURTHA. I think what Mr. McDade is talking about is the very concern we had, and I mentioned earlier when this legislation first surfaced, it was a recommendation by the Senate, and we just put money out there. And we said, no, we are not willing to go along with that. We want to keep this focus very narrow, and that is the dismantling of nuclear warheads.

Therefore we feel it is the right thing to do to spend U.S. defense dollars in that regard. And so, you know, it is easy to let a program just kind of slip away from that, but there are certainly enough warheads with the money available to continue that program. I would be very careful not to get into peripheral programs.

We also decided at the request of the President to put another $900 million from defense into what I consider an aid program which also obviously you have a stable Soviet Union; that is to our benefit. But with this program specifically I think you have run very narrowly, and it has had some gratifying results.

I know you get frustrated, you want to get a little ahead in doing other things, but I would admonish you to keep it to the core, and that is dismantling nuclear weapons.

Mr. Visclosky.

Mr. VISCLOSKY. Thank you, Mr. Chairman.

To get back to Mr. McDade's line for a moment, I would understand that with the exception of Russia, none of the former republics are engaged in producing new nuclear weapons.

Mr. CARTER. Absolutely.

WEAPONS MODERNIZATION AND PRODUCTION

Mr. VISCLOSKY. What about modernization? Are any of the other three republics besides Russia capable of modernizing the launch vehicles, the delivery system, of the existing weapons that they have?

Mr. CARTER. Certainly Ukraine is capable, because they build intercontinental ballistic missiles. They are capable of it. Under the START agreement they need to eliminate all of the strategic missiles or launchers on their territory. They have said they intend to do that and they will have to do that.

Now, they have an industry that used to produce ballistic missiles and space launch vehicles. We are encouraging them to continue to participate in peaceful civil space programs to the extent they want. We don't want them building missiles anymore, to convert that plant in Novosibirsk and let those people and those technicians and skilled workers do something else, and we are discussing that actively with them.

Kazakhstan and Belarus have no——

Mr. VISCLOSKY. And you are not aware that Ukraine is trying to upgrade or modernize their nuclear delivery capabilities?

Mr. CARTER. No, on the contrary, they are beginning the process of taking the warheads off the missiles, taking the missiles out of the silos, draining the fuel out of the missiles and blowing up the silos. It is all downhill. There is no uphill at all.

COUNTERPROLIFERATION

Mr. VISCLOSKY. As the Russians proceed, as the other republics proceed, are you satisfied with the safeguard mechanisms in place?

We had testimony earlier this year before the subcommittee that several people were arrested in a southwestern Asian country trying to sell plutonium and they had a quantity of plutonium with them. What is the status of proliferation as far as Russia and the other three republics are concerned?

Dr. SMITH. To the extent we can judge, we are rather impressed by the ability of the Russians to keep track of their fissile material. There have been some stories here and there. We have run them to earth. I am not free to discuss them here in this body, but I came away relatively pleased—not relatively—I came away pleased with the answers that were provided.

Secondly, the third thrust, I am not sure you were here during my opening statements, but our third major thrust in this world of weapons of mass destruction is precisely the problem you raise. We have already provided the Russians with safe transport equipment, and we intend to provide either to our inspectors, which we hope to send to Russia, or to the Russians directly, means by which they can keep track of all their fissile material.

We are doing everything we can to assist them. They seem to be receptive to exactly that, for the obvious reasons. They are more concerned about proliferation than even we are.

FISCAL YEAR 1995 BUDGET REQUEST

Mr. VISCLOSKY. In a sense I guess it is much closer to home for them. On the request—my understanding is you have a $400 million request for fiscal year 1995. My understanding of the $400 million is that it was originally a compromise of conference committee negotiations for fiscal year 1992. And yet that request in the out years has remained static at $400 million. Is that an accident? Is that a coincidence? Is there justification?

I understand the pull and tug of a conference committee—now, suddenly, this is the magical number.

Mr. CARTER. There is nothing magical about $400 million. I think in the future that will go up or down in accordance with our ability to conceive and agree with the parties on useful projects.

I would like to say and emphasize at this point that we will as we go along with some of these projects find that we have to renotify you and request either less money or more money for them, because as I described initially, when we first conceive the projects, we have not had the opportunity yet to discuss in detail with the partners on the other side exactly what we will do.

So it is very important that we come back and say, We don't need $40 million for that project. We only need 35. We may even come back to you and say, We want to stop that project. We are not able to conceive a common purpose with our partners over there and we want to terminate some projects.

So as time goes on, the amount we request from you may go up, may go down. There is nothing magic about the $400 million.

We do have as we have tried to indicate, looking ahead to fiscal year 1995, that volume, at least that volume of useful projects that we can conceive. So it may be that we would want to come back and request more, or ask to reprogram some other DOD funds into this. But we can see at least $400 million of useful projects in fiscal year 1995.

Dr. SMITH. Can I give you a manager's view from outside?

I have worked many years with companies such as Boeing. We like to build airplanes. Those are major——

Mr. VISCLOSKY. Or Lockheed, too.

Dr. SMITH. Or Lockheed, too. The fact is the way we like to run programs is we know what we want to do, we figured out what it takes, we know how long it takes, and we come to the CEO of Boeing or Lockheed and ask for money in those increments.

My tendency is to do exactly that here, recognizing that the President needs some flexibility with CTR money in his discussions with heads of state of the four republics. By and large what you asked for is exactly what I want to deliver. Dr. Carter was right on the mark when he said there is nothing magic about $400 million.

DEFENSE CONVERSION

Mr. VISCLOSKY. The enterprise funds would be taken out of the $400 million?

Mr. CARTER. Yes.

Mr. VISCLOSKY. Would these be a revolving fund or outright grant programs or loans?

Dr. SMITH. Let me explain first the reason for the enterprise funds. We want to be off the mark fast and that is why we are making grants to joint ventures strictly to the American partner in the joint venture to get at these weapons of mass destruction manufacturers. But we don't want to continue making grants year after year. We would rather create a fund in which the government's input is the moneys that we have been discussing.

One of the primary reasons for this is that first the return on investment can make it self-sustaining. But more importantly as a man of business one cannot, despite the style of DNA, wait four months for a free and open competition before investing in an opportunity. The opportunity has long since passed you by.

With an enterprise fund, with a independent board of directors operating outside the government, tough business decisions can be made on the spot and the investment can proceed as they do in the American society. So there are two reasons. The enterprise fund allows us to let government get out of the business and it creates a situation where the response can be businesslike, not bureaucraticlike.

Mr. VISCLOSKY. If I could ask another question on that. I have had a number of conversations with people in the contract community about our own domestic conversion program. I probably have now talked to representatives of 10 major manufacturing contractors. Unanimously they have indicated they think our conversion program domestically isn't worth the paper it is printed on and that it is probably more a creature of the Congress and politics than it is of good economic sense.

I can appreciate what you are doing with a rocket manufacturer delivery system manufactured in Ukraine. What is the mechanism a year from now when you come back that the committee can look at and say some of these did make sense? I don't begrudge you making the effort. The concern I have is, how can we come back next year and say some worked and some of them won't. How do we judge that a year from now?

Mr. CARTER. I would say the answer to that is you should be able to come back here and we should be able to explain how these projects have resulted in the reduction of military production and the shrinkage and reorientation of the industries that participate, the weapons of mass destruction industries that participate in this program shrinking and reorienting them to peaceful purposes.

I would also like to say, if I may, how different the situation there is as regards defense conversion from here. Here general defense conversion doesn't take place. Defense firms close, the invisible hand works and a new firm opens doing something else. There they have no active working market economy to make that transition, they have an immobile work force, large company towns where the enterprise takes care of the social welfare of the workers and it is a very rigid system.

Furthermore, they have no choice but to convert because much of the technical and managerial wealth of the country is tied up in these defense industries. So where we would let the invisible hand work here, that isn't going to take care of the situation over there and we don't want them to keep turning out weapons, selling weapons abroad so that they can keep producing weapons.

We don't want them beefing up their own military so that the State orders weapons from them. We want to give these defense enterprise managers a third choice, not to sell abroad, not to try to get the government to buy from them, but to go make something else.

Mr. VISCLOSKY. I would expect when you come back next year that you could be specific on that regard. I would not expect you to say every one worked out. You have to take a reasonable chance that they have a good basis to do so, and sometimes you win and sometimes you don't.

Dr. SMITH. You have it just right. I think you can ask me as a businessman one year from now how is it going and I owe you a bottom-line balance-sheet answer. You are right; some are going to go belly up and hopefully some will succeed. Each one that succeeds adds viability to the Russian economy and it is an example of how private enterprise works. So I think it is essential that we do make it succeed.

Mr. VISCLOSKY. Thank you.

Mr. MURTHA. Mr. Livingston.

WEAPONS TARGETS

Mr. LIVINGSTON. Thank you, Mr. Chairman.

I caught your last few comments and applaud your goals. I understand you may have already indicated that they are continuing to make new weapons. Are those weapons that they are making placed on line and where are they being targeted?

Mr. CARTER. We do not know that they are making new weapons. The point I was making is that Russia has facilities to make new weapons and clearly intends to have a nuclear arsenal in the future. Therefore, they may now and in the future be making nuclear weapons within those facilities. We also know that they are dismantling many more than they are making, but they may be making some in there, and we are trying to make sure that we are not contributing to that activity of continuing to make new weapons.

Mr. LIVINGSTON. Of their current extant nuclear force, what percentage of the weapons that exist and are on line are targeted at the United States? Do you know that?

Mr. CARTER. Yes, I think we do know the answer to that, as of May 31st of this year, which is zero. I am referring to the detargeting mutual announcement made by President Clinton and President Yeltsin in January.

Mr. LIVINGSTON. Do we have confirmation they are progressing along those lines?

Mr. CARTER. Let me make it clear that they have described to us that they are going to take the target programs out of the computers on board their missiles. They have explained to us in detail how they intend to do that. We will not be able to verify that that has occurred.

Mr. LIVINGSTON. Do you have any indication that they are following through with that commitment?

Mr. CARTER. Yes, we do, but that is not the main point. The main point of this program is to dismantle missiles. If there is no missile and there is no silo, then you know it is not aimed at you.

Mr. LIVINGSTON. I appreciate that point, but it will take sometime to dismantle weapons and in the meantime you have a lot of nuclear-tipped missiles which are available for mass destruction. As long as they are pointed at us we have every reason to be nervous. As of today you cannot tell us with any great assurance that they are not pointed at us?

Mr. CARTER. No. That is why we asked them not to point them at us anymore. The Cold War is over, and they said we will not have you targeting on a day-to-day basis anymore. But that is not good enough. We want to see the missiles dismantled, the warheads taken off and gotten rid of forever.

MAINTENANCE OF WEAPONS

Mr. LIVINGSTON. I concur in that desire. Of the missiles that are still in their forces that have not been dismantled or retargeted, what is the maintenance like? Is maintenance a problem for them?

Mr. CARTER. Let me distinguish Russia from the other countries in that regard. Over time as Russia set and Ukraine, for example, have drifted apart, Ukraine established itself as an independent country, Russia set up their own government, their own separate military organizations. There have been strains, whereas they used to be part of one country and experts could freely go back and forth and an expert in missile maintenance living in Russia could travel to Ukraine and take care of maintenance of missiles there. For a period of time it looks like that free transit will be interrupted.

We have insisted with both parties that they continue to cooperate in responsible maintenance and custody of nuclear weapons until they get rid of them. We want them to get rid of them as quickly as possible, but until then, to cooperate. The two sides have now agreed that they will cooperate to maintain safe custody during this interim period.

Mr. LIVINGSTON. So I understand from your testimony that as of now, to the best of our knowledge, the lack of maintenance is not at all a problem in Russia and may not be in Ukraine or other places?

Mr. CARTER. I wouldn't want to be completely reassuring in that respect because we know that there is in the Russian forces overall considerable demoralization, some lack of discipline, et cetera. To the best of our knowledge, and to the credit of the Russian military, the nuclear forces have held together better than the general purpose forces, and discipline, and budgets have remained intact to a much greater extent than the rest of their military forces. And we are grateful for that because, otherwise, we would be seriously worried if we saw the social disintegration of a nuclear arsenal.

Mr. LIVINGSTON. You would worry about the physical disintegration of the missiles themselves and about control?

Mr. CARTER. Morale, discipline.

Mr. LIVINGSTON. How about testing? Neither Russia nor the United States is testing warheads currently, are we?

Dr. SMITH. We are not and they have given us assurance they do not intend to. Within this forum I will say that we are rather confident that they are not testing.

Mr. LIVINGSTON. Does lack of testing deter quality maintenance?

Dr. SMITH. I don't think so, sir. I look at that problem from our end. The active arsenal is part of my responsibility so I have spent endless hours seeing whether our unwillingness to test is undermining the reliability and safety of our stockpile.

I can assure you with no qualifications that I am not concerned for the time being about the safety and reliability of our weapons.

Mr. LIVINGSTON. You say with no qualifications you don't think so and for the time being. That is a couple of qualifications.

Dr. SMITH. That is a good point. In the near term I am unqualifiedly confident that our weapons are safe and reliable. I have good reason to think that I can make the same statement for my counterpart in Russia. We know enough about their weapons to know that the best and the brightest of their engineers over the past 50 years worked in this program. We have good reason to think that they are in the same situation as we are.

WEAPONS MODERNIZATION AND PRODUCTION

Mr. LIVINGSTON. Hopefully, we will get dismantled in time. For the record, I would like you to provide at the appropriate classification level a defense intelligence analysis estimate as to whether Russia continues to produce or modernize nuclear weapons, under the proper classification.

[The information follows:]

Russian statements indicate they are developing a number of new strategic nuclear delivery systems. These include a new SS–25 class ICBM, an upgrade to the SS–N–20 SLBM, and, separately, a new SSBN (presumably with a new SLBM). The scale of new programs in development and production today is less than any previous Soviet period and most likely will remain at such levels through the end of this decade; however, the number of military-sponsored research projects and system development programs which appear to continue is higher than might be expected given the cuts that are occurring in the Russian military program in general.

———.

Mr. LIVINGSTON. To the best of your knowledge, are we utilizing the proper number of U.S. contractors and assisting them in denuclearizing?

Dr. SMITH. Legislation requires to the greatest extent feasible, and we are following it to the greatest extent possible. The answer is yes.

Let me say, sir, it was an artfully contrived bill, well done, and it is a pleasure to follow those guidelines. The answer is yes.

Mr. LIVINGSTON. And finally, do you have any fear that by U.S. participation and encouraging them to denuclearize, that we are in fact ultimately freeing up Russian assets to create other problems of whatever nature in the CIS or throughout the world?

Mr. CARTER. No. We try to be very careful that our assistance doesn't have that effect. One way we do that is to provide assistance in kind. We are not giving cash to anyone. We are giving them the equipment they need to do the job we have agreed with them we both want to do, not equipment, not cash, not for any old purpose.

Mr. LIVINGSTON. Thank you, Mr. Chairman.

Mr. MURTHA. Mr. Darden.

COUNTERPROLIFERATION

Mr. DARDEN. Thank you, Mr. Chairman.

Gentlemen, before I go into the only question I have, Dr. Carter, I notice that your title is Assistant Secretary of Defense, Nuclear Security and Counterproliferation. I realize the scope of this hearing is the cooperative threat reduction program. Does your charge include not only the Soviet Union but other areas in which there might be a proliferation of nuclear weapons?

Mr. CARTER. North Korea, Iran, yes.

Mr. DARDEN. I realize that this hearing is limited to that. Does your office have the whole scope of the nuclear proliferation problem within its charge?

Mr. CARTER. Yes, it does.

DEFENSE CONVERSION

Mr. DARDEN. My only question is this. I think it has been already answered by a question that Mr. McDade I believe propounded to Dr. Smith having to do in the area of defense conversion.

We have quite a limited budget ourselves in our committee for our American contractors, and right now, as you may know, Dr. Smith, there are a couple of projects going on in the Soviet Union where the United States companies are working with various cities and governments over there to convert production facilities which were previously defense plants to nondefense uses. But I believe I understood your answer awhile ago to Mr. McDade's question, that we only are converting those industries in the Soviet Union which previously have had the capability to provide either nuclear weapons or their components or some derivative-type function, is that correct?

Dr. SMITH. Absolutely, Mr. Darden. We insist that the firms that will be the benefit, with which we will form joint ventures, are in some way tied to weapons of mass destruction. It could be a rocket thrust motor, engines for cruise missiles, but in some way tied to weapons of mass destruction.

Mr. DARDEN. I know, for example, there is an Atlanta company who is working with the government of Chelyabinsk. Where is that?

Dr. SMITH. Chelyabinsk is one of the two nuclear weapon laboratories in Russia. It is our Livermore, our Los Alamos.

Mr. DARDEN. It is a former tank plant which has converted to production of pipe hangers and air-conditioning components; that is not under your auspices?

Dr. SMITH. No, we do not have a cooperative threat reduction defense conversion project as you described.

Mr. DARDEN. That was my concern, that whatever defense conversion funds that were being appropriated were being utilized for factories in which nuclear weapon components or related services——

Mr. CARTER. Or chemical and biological. If it was a plant that made tanks only, it would not qualify for the defense conversion portion of this CTR program. If, in addition to making tanks, it makes something related to weapons of mass destruction, then it would.

Mr. DARDEN. Do you have plans to return to the committee, Dr. Carter, to talk about some of your other areas of operation?

Mr. CARTER. I would be pleased to do so.

Mr. DARDEN. Is anything scheduled, do you know, Mr. Davis? Are there hearings scheduled to discuss other aspects of Dr. Carter's charge, counterproliferation in other——

Mr. DAVIS. No. We will have an intelligence hearing later this year.

Dr. SMITH. I should add, if you do call for such hearings, you should think of Dr. Carter and myself as Bobbsey Twins because I have the implementation side of counterproliferation just as Ash has the policy side. You better get used to seeing the two of us.

Mr. DARDEN. I don't think you will see me calling for hearings. That is the responsibility of other people here.

Thank you.

ENVIRONMENTAL CLEAN-UP IN BELARUS

Mr. VISCLOSKY. Gentlemen, if I could, I have a couple more questions. One is, you have an item for $25 million for environmental cleanup in Belarus.

Could you explain that and what is the connection with the elimination of nuclear weapons?

Mr. CARTER. What we are doing there and its purpose, the base that is being restored is a base from which we expect SS–24 ICBMs to be removed. Belarus has SS–25 mobile missiles on its territory. They are the only ballistic missiles that Belarus has. It doesn't have silo-based missiles or bomber weapons. It has these mobile missiles.

We have been encouraging the Belarussians to close those bases and send those missiles back to Russia and to do that in the fastest possible time. They have said to us, We are prepared to do that in the fastest possible time but we have people working at the bases, we have to close the bases. The Russians have been there for a long time. We don't know what they have done, whether the bases are habitable anymore. And they have a number of these bases in Belarus.

We understand if you are going to close the bases you need to worry about the people who used to work there and whether the area can be developed for some other purpose. What we are doing at one of the bases in Lida with this money is two things. First, training Belarussians to do the environmental surveys at all these bases where they have these missiles. We don't want to spend the money to do the surveys ourselves. We are training them, saying, Do it yourself.

Secondly, giving training to some of the SRF officers, Strategic Rocket Forces officers who operate the forces so that when the missiles drive away, they have something to do. Otherwise, they are not going to want the missiles to drive away.

So it is directly related to denuclearization, but it is not dismantling the missiles, it is hastening them on their way. In Belarus, because they are not going to be dismantling the missiles or the silos, this is the mechanism we are using to make sure that those missiles leave their territory in the shortest possible time.

UKRAINE PARTICIPATION

Mr. VISCLOSKY. Could you explain your perception of the situation in the Ukraine? The Presidents agreed but I understand you would need legislative approval.

Mr. CARTER. The——

Mr. VISCLOSKY. Also, would some of the dismantling take place in Ukraine itself, or would the weapons be removed to Russia and you would do it at a site in Russia?

Mr. CARTER. Nuclear warheads will be removed from Ukraine to Russia and dismantled. Missiles and silos will be dismantled and eliminated on the territory of Ukraine.

The general Ukrainian situation has shown considerable progress in the last couple of months as a result of the Trilateral Accord. There are two ingredients to the Trilateral Accord, both U.S. instigated. We have said to the Ukrainians and to the Russians, We don't want to wait seven years, which is how long START gives you to get rid of these things. We want to do early deactivation, get the warheads off and back to Russia to be dismantled.

The second ingredient of the trilateral accord is we said, We will sit down and help you work out your differences because they are at odds over all kinds of things, the Crimea, the Black Sea fleet, and we don't want the fact that they are at odds to get in the way of this process. We said, Let us help you work out an arrangement whereby you will remove all the nuclear weapons from the Ukraine in the shortest possible time.

It was that agreement that President Clinton arrived at with President Kravchuk of Ukraine and President Yeltsin of Russia in January. That is a very significant agreement because it takes the Ukrainians much further than START alone would take them in terms of a commitment. START only talks about silos, doesn't talk about warheads. It gives you seven years; the Trilateral Accord gives them a much shorter period of time.

You asked whether President Kravchuk will deliver on this agreement. It was very important to us in crafting the agreement that it be done in such a way that the good sense of carrying forward with this agreement would be evident to everyone in Ukraine and not just to the President. That is why before the agreement was concluded, we tried to bring the Ukrainians and the Russians to agreement on compensation to Ukraine for the value of the highly enriched uranium in the warheads so Ukraine would feel that they weren't just shipping these back to Russia, but anything that was valuable in the warhead they would get the benefit of.

In these negotiations, we also emphasized our willingness through this program to help them carry this out and that was very important for Kravchuk in winning support of his legislature, because the legislators feel this is a burden they are stuck with. Even if they want to get rid of them, they cost a lot to get rid of. We are offering to help—not to pay the whole cost but to assist them, and that was very important.

So because of these inducements, the Rada legislature in Ukraine has greeted Kravchuk's agreement favorably and leaders of the Rada have supported the agreement, and that is why I think we have a much better chance the agreement will be carried out.

Just this week the first trains carrying warheads that were a couple of weeks ago on top of missiles aimed at us, are now on trains heading back to Russia.

Mr. VISCLOSKY. Was there any representation made by the United States or our NATO allies that we would intervene or be involved as far as protection of Ukraine sovereignty? You mentioned the Crimea, for example.

Mr. CARTER. There was a portion of the Trilateral Accord which concerned security assurances to Ukraine, not security guarantees—two different terms of art. A security guarantee would be the kind of commitment we give to our closest allies, which is a firm military commitment. But we did provide Ukraine security assurances and the British and the Russians did the same in the same way, an assurance that we respected their territorial integrity, their borders, that any dispute about borders should be addressed peacefully, that they would be free from economic coercion. They were particularly concerned about that with respect to the Russians.

So as part of this agreement, the United States, Britain and Russia all extended these security assurances but they are not the same as a NATO treaty commitment which is a commitment of military action. We did not make such a commitment to Ukraine.

Mr. VISCLOSKY. Thank you very much.

Thank you, Mr. Chairman.

DISMANTLING OF NUCLEAR WARHEADS

Mr. MURTHA. I notice that you said that the Russians don't want and don't need any help in dismantling their nuclear warheads. I know maybe it comes from just years of not trusting the Russians or the former Soviet Union, but always one worrisome thing about the program was that they are building new ones and we are buying the old ones. We can get into a situation where we are spending a lot of money and they are upgrading them with our money. Is there any assurance that they are destroying their nuclear warheads?

Dr. SMITH. The reason I proposed the third major thrust is to get exactly at your question, Mr. Chairman. What we want to do over the coming months is to get the Russians to agree with us to allow exactly that insight.

Mr. MURTHA. We want to help you with that. For instance, I am not sure that I see that you can really use the $400 million this year from an obligation standpoint. Certainly we want to work with you. We want to make sure they understand we are serious in helping them. But on the other hand, we want them to also understand we have to see some progress in actually dismantling the weapons.

As you negotiate with them, put as much pressure on them as you can and say that the committee is concerned about the ultimate dismantling of the weapons, and unless we see some progress in that regard, there is going to be no money available to continue the operation.

It is hard for me to believe Ukraine will get rid of all their nuclear weapons, even though they say they agree to it. That would really be to me a surprise. And I don't know if it would be a surprise if they destroy the old ones, but I would like to see some evidence of it.

So I wish you would take that back while you are negotiating with both parties, that we want to see some progress in this regard or there won't be any money available.

Dr. SMITH. Let me respond to that with what might be a surprise. I want to thank you for those words and demonstrate that with a story of the Russian Christmas Eve. One of the reasons we were successful there is because Congressman Lancaster looked the Russians right in the eye and said, I, Lancaster, am going to lead the charge to cancel the CTR program unless you agree to the very fine proposal that has been put on the table. I admit they didn't understand, but we had a very forceful interpreter who made it very clear in Russian.

The negotiation changed; they got the message and they are doing it our way, which I think is the correct way. What you have charged us to do aids me enormously in my negotiations with them.

Mr. CARTER. One further comment on that. His words I think, if I may say so, are a little too strong, that they would not agree. I think we have an opportunity to make inroads into what is for the Russians, the sanctum sanctorum, their actual facilities where they build and dismantle nuclear weapons. I do not rule that out. That is one of our future thrusts.

A couple of reasons I have hope in that regards. One is we know the Ukrainians are in there because part of the deal they made with the Russians is "we have to know that the weapons leaving our country are dismantled and not just stored to use later against us." The Russians have given the Ukrainians access to those facilities. That is one of the reasons we know they are dismantling warheads. If the Ukrainians can get in there, maybe we can as well.

Secondly, we are much more forthcoming ourselves about our own operations with nuclear weapons and we are, as Dr. Smith said, are willing to take them to our dismantlement facilities. So I don't rule out at all that we will get access to the facilities in Russia where nuclear weapons are put together and taken apart, and we are working on both, kind of chewing in on both sides of the pipeline at them.

We are working on the transport and storage problem and on fissile material accounting, control and storage downstream of dismantlement, and I think we will chew right into those dismantlement facilities before long.

Mr. MURTHA. We want to see results, and we mark up in a couple of months so we would like to see results by that time as you go through negotiations.

Mr. Skeen.

STORAGE AND REPOSITORY SYSTEM

Mr. SKEEN. Thank you, Mr. Chairman.

I have a particular interest in waste facilities and repositories because, as you know, one of the companies in our State is doing cask construction for some of the TRU material. Can you give me some idea gas to whether or not do we have access to their storage and repository system, or do we know where it is? How are they disposing of it?

Dr. SMITH. They are certainly interested in using the canisters that you mentioned, Mr. Skeen. We are very satisfied with the progress we have made there. They are in the process of being delivered. We know what they are going to be used for.

We are in constant discussion on the actual designs of the storage facility that you mentioned. We do know where it goes. It is not at Tomsk. It is elsewhere. Although we—although it is difficult, as I mentioned in my opening comments, to deal with the Russians on issues that are sensitive to them, this project is on track and I do anticipate it going to completion.

Mr. SKEEN. Very good. What concerns me is that with as much difficulty as we are having with our repository system here in the United States—and I am sure the Russians know because of the vast expanses they have and the isolation areas that they have, it has become a hot political item for us—but it would be a good indication of how sincere they are about dismantling, exactly what they are doing with the waste.

Dr. SMITH. You couldn't be more on point, sir. That is why we are making a thrust in that direction, to test their seriousness to the limit.

Mr. SKEEN. Thank you, gentlemen.

Mr. MURTHA. Thank you, gentlemen. There will be additional questions for the record. The Committee will adjourn until tomorrow morning at 10 o'clock.

[CLERK'S NOTE.—Questions submitted by Mr. Dicks and the answers thereto follow:]

START COMPLIANCE—DISMANTLING OF NUCLEAR WEAPONS

Question. Under the START compliance, how many weapons have you dismantled? How many nuclear weapons have been dismantled in Russia?

Answer. The United States has already removed over 90% of the warheads from ballistic missiles whose launchers will be eliminated under START I. We will have removed 100% by the end of this year. The Russians recently gave us information that shows they have removed about one-third of such warheads. Although neither START I nor START II requires that nuclear warheads be eliminated, the United States dismantled about 2,000 warheads last year and plans to continue at about that rate in the future. The Russians told us that they have been dismantling about 2,000-3,000 warheads per year.

Question. How much money has been given to the former Soviet Union since the beginning of this program?

Answer. No money has been given to the former Soviet Union states eligible to receive assistance under the Cooperative Threat

Reduction Program. DoD CTR funds are used to provide assistance, in the form of goods and services. Such assistance is generally provided through contracts with US companies, for goods and services to be provided at the lowest cost, in the shortest practicable time.

Question. How much business has been realized by US industry since the program began.

Answer. As previously indicated, with minor exceptions for project assessments and administrative and travel costs, CTR funds obligated to date have all gone to US industry for goods and services to be provided to the FSU states as assistance.

Question. By transferring all of the weapons of mass destruction from the independent states to Russia, are you concerned about rearming Russia?

Answer. No. We believe that returning nuclear weapons to Russia will, in many cases, facilitate their dismantlement. Russia has pledged to dismantle a large number of its non-strategic nuclear weapons, many of which were located in, and have been withdrawn from, the newly independent states. Furthermore, in the January 14, 1994 Trilateral Statement, Russia has also committed to dismantle all strategic nuclear weapons that will be returned from Ukraine.

RUSSIAN CHEMICAL WEAPONS DESTRUCTION

Question. In your testimony, Dr. Smith, you indicated that the U.S. assistance to Russia in the chemical weapons area includes that potential assistance in the construction of a destruction facility. Can you elaborate on this ? What type of destruction capabilities would such a facility have? When could such a facility be available? How much U.S. assistance would be provided for this?

Answer. The individual responsible, up to early April, for Russian chemical weapons destruction was Anatoly Kuntsevich. During our first meeting, he outlined the Russian destruction program and asked the United States to provide one or two nerve agent destruction facilities. Academician Kuntsevich also sought assistance from other nations. On numerous occasions, and to different audiences, he has stated that Russia could not meet the destruction deadline mandated by the Chemical Weapons Convention, due to the cost of destroying chemical weapons.

The Department of Defense has currently agreed to provide up to $55 million in assistance to the Russian Federations' chemical weapons destruction program. This assistance will fund contract planning support and equip a centrally located, analytical chemical weapons destruction laboratory. These two projects create a solid and necessary foundation for our assistance to the Russian Federation.

The most logical next step is to focus further Department of Defense assistance on actually destroying chemical agents. As I mentioned in my oral statement, funding for the design and construction of a nerve agent destruction facility is being considered. The facility would be designed to destroy Russia's most modern munitions filled with organophosphorous agents. A similar facility built in the U.S. would cost approximately $350 million. There will be some adjustment based on the cost of construction in Russia. Also, there are additional unknowns. For example, the destruction facilities location, destruction methodology, and throughput cannot be identified until we have more serious discussions with the Russians. We will not have an accurate picture of their chemical weapons inventory until they deliver the technical data required by the Joint Plan of Work. If we can come to closure on these and several other issues, a destruction facility could start operations in late 2000.

[CLERK'S NOTE.—End of questions submitted by Mr. Dicks. Questions submitted by Mr. Wilson and the answers thereto follow:]

STRATEGIC OFFENSIVE ARMS ELIMINATION

Question. I understand that Russian demilitarization officials are concerned that equipment being supplied under Nunn-Lugar is not responsive to their needs. They point to the shears for submarine destruction that are not the type used for U.S. projects and the specified incinerators for missile fuel that employ old equipment designs rejected by the Russian authorities.

Please comment on the way that equipment choices are made and specifically address the shears and the incinerators.

Answer. Equipment specifications are jointly determined by Russian and US technical experts. The work to be performed is outlined and the experts discuss potential equipment approaches to the job until both sides agree on a specific item. Once agreement on the equipment is reached, experts of the recipient nation are invited to participate in the development of solicitations to industry and as advisors to the source selection board process. This process is used in all equipment specification determinations, to include the shears to be provided to Russia to assist in the elimination of launchers in ballistic missile submarines. In this specific case, the process was followed as described to include an agreement between the sides to conduct a demonstration of two types of shears prior final procurement.

The Russians have asked, and the US has agreed, to not provide the incinerators as originally agreed in the August 1993 implementing agreement. The Russians have determined that existing incinerators can be easily modified To eliminate the amounts of missile propellant planned for incineration and that US incinerators will not be required. In lieu of incinerators, the US has agreed to solicit from western industry, proposals to eliminate the propellant in such a way as to provide some economic benefit to Russia. The implementing agreement will be amended to reflect the substitution through an exchange of letters between the Russians and the US.

Question. The START agreement requires Russia to complete the destruction of hundreds of missiles by 2003, a very tight schedule in light of the infrastructure and other needs in Russia.

I understand that our missile destruction assistance under Nunn-Lugar is limited to equipment and supplies. Could the pace of missile destruction be improved by expanding our assistance to project management and technical assistance?

Why is project management and technical assistance not being provided now?

Answer. The US is providing varying levels of assistance in the elimination of strategic offensive arms within the NIS. For Russia, the jointly determined level of assistance takes the form of equipment, supplies, technical training on equipment use, equipment maintenance and support, and logistical integration.

During negotiations and subsequent exchanges between US and Russian technical experts, the US side proposed the concept of an overall contractor to integrate the various assistance areas to be provided. The Russian side has continuously maintained that no additional assistance, other than that which is currently agreed, is required. The Russians further maintain that they have the necessary expertise and management capability to accomplish their elimination requirements. The only cited need was for equipment and the services and maintenance required for support and maintenance.

Question. I understand that a senior Russian official was taken to a US government facility and shown a government design for an incinerator to burn rocket fuel. The Russian official reportedly felt the equipment used was outdated.

Are we promoting old technology as a jobs program for government employees? Did our government take the Russian official to any private U.S. contractor facilities to see other kinds of incineration equipment?

Answer. A Russian delegation of exports participating in discussions of assistance for the elimination of Russian strategic offensive arms, visited the Environmental Protection Agency's Incineration Research Facility (IRF) in Arkansas. The objective of the visit was to determine incinerator performance specifications required to meet US and Russian requirements. Once determined, these specifications were to form the basis of a solicitation to industry to provide eight commercially procured incinerators to meet the requirement identified in the implementing agreement. There was no intention of proffering the IRF as the incinerator type that would be provided to the Russians (this fact was explained several times to the Russian delegation). No private contractor facilities were visited as industry would have been able to compete for a contract for the incinerators once the performance specifications were determined. Recent developments in US-Russian discussions have resulted in the deletion of incinerators in the assistance package for Russia (See answer to question 1).

[CLERK'S NOTE.—End of questions submitted by Mr. Wilson. Questions submitted by Mr. Young and the answers thereto follow:]

NUCLEAR DISARMAMENT OF FORMER SOVIET UNION

Question. Secretary Carter, your prepared statement mentions the fact that some of the funding you are requesting will go to defense conversion programs in states of the Former Soviet Union. Since these funds are provided to assist with the nuclear disarmament of the former Soviet Union, are these conversion funds going to be used to assist with the conversion of the nuclear weapons complex which existed in the states of the former Soviet Union to peaceful purposes?

Answer. These conversion funds will be used to help reorient defense industries of the former Soviet Union toward civilian purposes with an emphasis on converting those firms associated with weapons of mass destruction. This assistance is intended to promote joint business initiatives and partnerships between U.S. companies and firms in the former Soviet Union that are converting from production of defense goods to civilian goods. The concern that the republic governments have about the social, economic, and political costs when defense and military workers are displaced by closing bases and defense plants discourages them from dismantling the facilities that threaten us. By offering prospects for alternative employment for defense workers and decommissioned military officers as well as alternative uses for assets previously dedicated to the production of weapons of mass destruction, our conversion assistance is integral to our goals of denuclearization and dismantlement. Without defense conversion, the republic governments and plant managers might become convinced that they have little alternative but to keep weapons production lines open, which increases the danger of unconstrained arms exports and proliferation. Through defense conversion we can decrease the incentives for the republics to produce weapons of mass destruction, and thereby reduce the threat to us.

Question. How much funding is going to be used for defense conversion?

Answer. A total of $115 million has been allocated for defense conversion in the former Soviet Union in FY 1993 and FY 1994, with $30 million allocated in FY 1993 and $85 million in FY 1994.

Question. Please provide a list of the projects which will be funded and the purpose of those conversions?

Answer. The DoD will assist in the formation of business initiatives in the following areas:

Russia: $40 million

Conversion of selected defense industries to production of prefabricated housing for servicemen who are demobilized

Conversion of selected defense industries to production of civilian goods

Ukraine: $40 million

Conversion of selected defense industries to production of prefabricated housing for servicemen who are demobilized

Conversion of selected defense industries to production of civilian goods

Belarus: $20 million

Conversion of selected defense industries to production of civilian goods

Construction of housing for servicemen who are demobilized

Retraining of servicemen who are demobilized

Kazakstan: $15 million

Conversion of selected defense industries to production of civilian goods

We also: (1) have placed the International Executive Service Corps (IESC) under contract to provide technical assistance to FSU firms that are converting to civilian activities and U.S. firms interested in forming partnerships with those firms, (2) are working with the Commerce Department to publish directories of defense firms interested in converting to peaceful purposes and forming partnerships with U.S. firms for civilian production, and (3) are capitalizing a Demilitarization Enterprise Fund to make investments in partnerships between FSU defense firms that are converting and non-FSU (principally U.S.) businesses.

Question. Specifically, can you tell us what will happen to the parts of the Nuclear Weapons complex which produced nuclear generators for the triggers which would have been used to detonate the nuclear weapons? How many plants did this kind of work? Will any still be in existence after the Former states complete their disarmament plans?

Answer. ———.

Question. Another part of your work involves the destruction of chemical weapons. They have an even bigger job than we do. Are they considering destruction by the cryofracture method? What is the status of their chemical destruction program?

Answer. The Russian Federation has not yet selected a CW destruction technology. The Cryofracture technology is one of several different technologies Russia is studying. As part of the 1994 Plan of Work for U.S. assistance to Russian CW destruction, the U.S. has provided its incineration technology facility design package for CW destruction designed for the Newport Chemical Agent Disposal Facility and a copy of the comprehensive report from the National Research Council on alternate destruction technology. Additionally, the U.S. as part of the 1994 Plan of Work will provide Russia a document containing the criteria and techniques which it could use to assess CW destruction methods and technologies.

The Russian CW destruction program continues to encounter difficulty with obtaining the local popular support needed to select sites to construct destruction facilities, selecting a safe, acceptable destruction technology, and obtaining program funding. These difficulties could affect the Russian ability to destroy its CW stocks under the Chemical Weapons Convention destruction timelines. The U.S. remains committed to assisting Russia with its destruction program and, to date, has allocated $55 million of Nunn-Lugar assistance to this effort.

Question. This morning's Washington Times reports a fire in the electric generator at the largest power station in the Ukraine yesterday. Fortunately the news reports indicate no release of radiation, but that brings back memories of Chernobyl. Last year, the Ukrainian government decided to restart two of the nuclear reactors at the Chernobyl power station which had been shut since an accident at St. Petersburg in March of 1992. In the face of reports citing reduced maintenance and with diminished operator skill levels throughout the nuclear power generating facilities of eastern Europe, what sort of safeguards are in place to prevent another nuclear fire and explosion?

Answer. This question should be answered by the Department of Energy, as DoD programs and activities do not focus on safeguards for nuclear power reactors. However, our Military-to-Military Contact programs encourage military and civil cooperation in planning for response to the consequence of a nuclear reactor accident. That program has given us some limited access to nuclear power plants in Bulgaria, Lithuania and Romania to date; and we took technically competent representatives of the Department of Energy on the most significant one of those visits to date—the Ignalina Power Station in Lithuania.

Question. Are adequate funds being directed at maintenance and operator training programs to achieve a safe operating environment?

Answer. This question should be answered by the Department of Energy, as DoD programs and activities do not focus on maintenance and training programs for nuclear power reactors.

Question. What lessons have been learned about preparedness to deal with a nuclear explosion as a result of analyzing the Chernobyl event?

Answer. DoD has not made an independent analysis of preparedness for the Chernobyl event per se; and we would rely on the Department of Energy and the Federal Emergency Management Agency for such analyses. However, we have engaged in dialogue with the governments of the Baltic nations, Bulgaria, the Czech Republic, Romania, Slovakia and Hungary regarding civil defense and related systems by which they prepare for response to similar events. One aspect that is common to all is preparedness to monitor radiological effects of an event; and all have relevant monitoring data from the aftermath of the Chernobyl event. Another is the manpower intensive nature of response activities; and we have met leaders of the thousands of Latvian and Lithuanian civil defense workers who were sent to the Chernobyl area to perform essential clean-up activities in the months immediately following the accident. Corresponding to the latter is the existence, within the nations of Central and Eastern Europe, or military "civil defense regiments" and similar units, which have a varying range of capabilities to deal with the consequences of large scale disasters of all kinds, including radiological accidents.

The most striking lesson we have learned is that all planning and preparedness before Chernobyl was strictly limited to national boundaries by the Soviet system of controls. The republics of Central and Eastern Europe have little or no experience in cooperating with each other to prepare for a nuclear reactor accident like Chernobyl. When asked by the USEUCOM Contact Teams led by DoD's Emergency Planning Directorate if they would like to plan together, they respond unanimously and enthusiastically in the affirmative. Therefore, our initial dialogue with each nation and our follow-on initiatives focus on highlighting the actual capabilities each nation has, and on the potential for cooperation among those nations in preparing for all forms of catastrophe, but especially a nuclear reactor accident.

For example, the Ignalina Power Plant in northeastern Lithuania is less than ten miles from Belarus, and the closest city to it is Daugavspils in Latvia. When asked if they planned with Belarus and Latvia for response to a disaster at Ignalina, the Chief Planner for Lithuania's military civil defense structure said, "No" (although there is a single telephone "hot line" for warning to Daugavspils). When asked if he would like to begin planning with them, he answered, "Yes." Therefore, in September 1993, the USEUCOM Mil-to-Mil Program and the Pennsylvania National Guard sponsored a very brief workshop in Hershey, PA, for emergency planners from all Baltic nations and Belarus, which included visits to the Three Mile Island nuclear power plant and FEMA's Emergency Management Institute. USEUCOM has budgeted for FY 1995 a follow-on workshop in Lithuania, in which all four nations will actually compare and coordinate their separate plans for response to an Ignalina disaster with facilitation by representatives from U.S. Federal and State agencies including DoD and the National Guard.

Similarly, in July of 1993, when Romania's military civil defense organization was asked by the USEUCOM Contact Team if they planned with Bulgaria for the contingency of a nuclear reactor at its Kozloduy nuclear power plant on the Danube, the answer was, "Yes, we recently began to do so." Therefore, the USEUCOM Mil-to-Mil Program, and the Alabama and Tennessee National Guard as partners for Romania and Bulgaria respectively, are facilitating coordination of planning between those two nations. Those activities include simultaneous visits to Huntsville, AL, and the Brown's Ferry Nuclear Power Plant of TVA for the heads of military civil defense organizations of both nations, plus an orientation program for computer operators of each nation at the U.S. Army Space and Strategic Defense Command (SSDC) in Huntsville. Under an FY 1994 Congressionally-mandated program to enhance improvement of disaster preparedness at U.S. military installations, SSCD is developing (with oversight from DoD's Emergency Planning Directorate) a map-based computer template for testing civil emergency plans across State or other jurisdictional line in the U.S. They will experiment with Romania and Bulgaria to consider the potential to contribute that template (software) to the international emergency preparedness community. DoD also will assist Romania and Bulgaria in hosting for the 38 nations of NATO and its North Atlantic Cooperation Council partners a Seminar which emphasizes both realignment of military civil defense organizations for peacetime emergency preparedness and cooperation in planning for nuclear accident contingencies.

Question. What have we learned about the health effects of continuing low-level radiation of the population of the areas affected by the Chernobyl radiological contamination and the spread of Plutonium?

Answer. This question should be answered primarily by the Department of Health and Human Services and the Department of Veterans Affairs, both of which have studied effects of radiation of populations; also FEMA, which collects such data from a wide range of sources. A supplemental answer will be furnished by the Armed Forces Radiobiology Research Institute, which cooperates in such research from the perspective of military and defense interests.

Question. Do we have programs that provide for continuous monitoring and research on the health effects of the populations exposed?

Answer. This question should be answered primarily by the Department of Health and Human Services and the Department of Veterans Affairs, both of which have studied effects of radiation on populations; also FEMA, which collects such data from a wide range of sources. A supplemental answer will be furnished by the Armed Forces Radiobiology Research Institute, which cooperates in such research from the perspective of military and defense interests.

Question. Are these programs coordinated with the effected countries, such as Belarus, Ukraine and the Russian Federation?

Answer. This question should be answered primarily by the Department of Health and Human Services and the Department of Veterans Affairs, both of which have studied effects of radiation on populations; also FEMA, which collects such data from a wide range of sources. A supplemental answer will be furnished by the Armed Forces Radiobiology Research Institute, which cooperates in such research from the perspective of military and defense interests.

Question. Does your department support research and analysis of the Chernobyl event to determine how better to prepare, prevent and deal with the effects of a future event?

Answer. The Department of Defense does not support research and analysis on preventing a Chernobyl-type event; and our current activities within the U.S.A. and Europe, which relate to preparing for and dealing with the effects of such an event, can hardly be referred to as "research." However, in the U.S.A., we cooperate fully with a wide range of Federal and State initiatives to plan and prepare for life-saving response to nuclear accidents under both the Federal Radiological Emergency Response and Federal Response Plans. In Europe, through NATO, and in recently initiated contacts with the European Communities Humanitarian Organization and the United Nations Department of Humanitarian Affairs (Geneva), the Department of Defense is cooperating with, and indeed serving as a catalyst for, several initiatives to foster cooperative international military and civil preparation for response to any Chernobyl-type event.

[CLERKS'S NOTE.—End of questions submitted by Mr. Young. Questions submitted for the record and the answers thereto follow:]

OBLIGATION RATES

Question. In fiscal years 1992 and 1993, the Congress provided a total of $800 million in transfer authority for this effort. In fiscal year 1994 another $400 million in direct appropriations were provided. The fiscal year 1995 request is for another $400 million in direct appropriations and an additional $215 million in transfer authority. The total of direct appropriations and transfer authority over these 4 years exceeds $1.8 billion. As of February 28 of this year you had only obligated a total of $114 million.

Will you obligate the remaining $1.7 billion between now and the end of fiscal year 1995?

Answer. Because $212 million of the FY 1992 transfer authority expired at the end of FY 1993, before funds were transferred, the total of direct appropriations and transfer authority available if the FY 1995 request is approved would be $1.6 billion. Total anticipated obligations through FY 1995 are expected to be nearly $850 million. However, this program is unique in the Department of Defense. Out of the current $988 million in available authority, $897 million is committed in signed project implementing agreements with the eligible FSU states. Many of the projects under these agreements are multiyear procurement type activities. Thus, obligational authority must be available, but actual outlay rates are expected to stretch over several years.

Also, a buildup in unobligated funds have developed as an inherent part of the CTR process which Congress set up requiring notification of proposed obligations. There is a time lag between required reports of proposed obligations to Congress for each project and the negotiation and signing of project implementing agreements with the FSU states. Prior to negotiations, in order to ensure that the Department has the budget authority available to back up any commitments made in international agreements, a notification of proposed obligations must be reported to Congress. However, negotiations for some projects have taken up to two years to result in signed agreements after the prior notification has been reported.

Additionally, nearly $522 million for FY 1992 and FY 1993 projects could not be obligated due to other legislative and funding requirements, specifically, the annual certifications, the need to address the expired FY 1992 transfer authority, and the requirement to apply reprogramming rules on the remaining FY 1993 transfers. Each of these have slowed the pace of program obligations.

However, the pace of obligations is now climbing steeply. The Department intends to nearly treble obligations in the last half of FY 1994. Requests for Proposals (RFPs) to award contracts are moving forward quickly since the certifications were submitted in early February 1994 and notification requirements have been met for use of the FY 1994 direct appropriation. Actual obligations are currently over $200 million.

Question. According to the budget justification that you have submitted you will only have obligated approximately $0.6 billion by the end of fiscal year 1995. If the Congress denied the entire fiscal year 1995 request of $400 million and rescinded the entire $400 million already provided in fiscal year 1994, wouldn't there still be sufficient transfer authority to cover the projected obligations?

Answer. No. There would not be sufficient Cooperative Threat Reduction (CTR) transfer authority to cover the projected program obligations required to meet agreements for assistance would be possible in important areas where current programs are just starting to address the enormous tasks of facilitating the destruction in the former Soviet Union states.

As indicated previously, the FY 1994 direct appropriation has been used to cover commitments made in international agreements under the FY 1992 transfer authority which expired. The process by which these agreements with a foreign government are made is time-consuming and the projects are often multiyear. The Department cannot legally sign such agreements without authority available. DoD is complying with the Congressional oversight mechanisms to make obligational authority available by providing prior notification of proposed obligations before negotiating and signing agreements which will result in the obligation of funds. Thus, in accordance with the system set up by Congress, actual program obligations lag behind the notification of proposed obligations and the negotiations. The gap is closing, but without the full obligational authority made available, existing projects could be held up (such as with the FY 1993 programs currently waiting Congressional approval in the FY 1993 reprogramming request) and the momentum of the CTR program could be stopped.

Question. For the record, please provide a detailed listing of the cumulative obligations by country and project which are planned by the end of fiscal year 1995.

Answer. Currently, the Department of Defense has notified Congress of a total of $961 million in proposed obligations for the Cooperative Threat Reduction Program. These are identified by project and country below. Of this $961 million, projected cumulative obligations through FY 1995 are estimated at $854 million, however, these estimates will depend on continuing discussions to refine project requirements and the pace of awarding contracts under existing project agreements. These projections may vary substantially during FY 1995.

SUMMARY—March 31, 1994

[In millions of dollars]

Country/project	Obligations—subject to change		
	Proposed FY92–94	Actual FY92–94	Projected FY92–94
Russia:			
International Science and Tech Center	$25.00	$1.42	$25.0
Fissile Material Containers	50.00	42.90	50.0
Armored Blankets	5.00	3.24	3.2
Emergency Response Equipment	15.00	11.34	15.0
Railcars	21.50	20.00	21.5
Material Control and Accounting	30.00	.15	10.0
Chemical Weapons Destruction	55.00	2.79	55.0
Storage Facility Design	15.00	14.95	15.0
Storage Facility Equipment	75.00	0	41.0
Defense Conversion	40.00	.07	40.0
Export Control	2.26	0	0.0
Strategic Offensive Arms Elimination	130.00	4.27	100.0
Arctic Nuclear Waste Study	20.0	7.37	20.0
Ukraine			
Science and Technology Center (STC)	10.0	0	10.0
Emergency Response Equipment	5.0	0	3.8
Material Control and Accounting	12.5	0	9.0
Government-to-Government Com Link	2.4	.04	1.0
Export Control Assistance	7.26	.01	7.26
Strategic Nuclear Arms Dismantlement	185.0	.26	110.0
Defense Conversion	40.00	0	40.0
Nuclear Reactor Safety	11.0	0	11.0
Belarus:			
Emergency Response Equipment/Training	5.0	3.7	5.0
Continuous Communications Link	2.3	.30	2.3
Export Control Assistance	16.26	.44	15.0
Project Peace/Defense Site Environment	25.0	0	14.0
Strategic Arms Eliminatoin	6.0	0	2.0
Defense Conversion	20.0	.52	20.0
Kazakhstan:			
Material Control and Accounting (MC&A)	5.0	0	5.0
Strategic Arms Elimination	70.0	0	50.0
Government-to-Government Com Link	2.3	.01	1.5
Export Control Assistance	2.26	0	2.26
Emergency Response Equipment/Training	5.0	0	3.8
Defense Conversion	15.00	0	15.0
General Program:			
Defense and Military Contacts	15.0	.20	15.0
Other Assessments/Support	15.0	3.80	15.0
FY95 Projects	0.0	0.0	100.0
Total	961.04	117.80	853.6

TRANSFER AUTHORITY

Question. In addition to $400 million in direct appropriations, the budget also requests $215 million in transfer authority in fiscal year 1995. Every year the Committee includes general transfer authority of approximately $2 billion for the Secretary of Defense to accommodate unforeseen circumstances during program execution for all DoD programs. Why do you believe it is necessary to have an additional separate transfer authority from that provided for the rest of DoD?

Answer. The request for $215 million transfer authority in FY 1995 is a one-time request to replace the FY 1992 transfer authority which expired at the end of FY 1993. The commitments in signed international agreements with other nations to provide CTR assistance under the FY 1992 transfer authority must legally and politically, be backed by budget authority. Thus, the Department has sought to recover the FY 1992 transfer authority in the FY 1995 budget request.

The Department does expect to request a reprogramming as necessary in FY 1994 under the general transfer authority to cover the $212 million which expired. However, when the FY 1995 Budget Request was submitted, it was uncertain if the expired FY 1992 transfer authority could be recovered by such an FY 1994 reprogramming. As agreements had already been signed with FSU states the Department had to ensure the commitments under these agreements could be met. This is why we requested specific transfer authority for $212 million in FY 1995. We would not need this transfer authority, if Congress approves reprogramming requests to support these commitment during FY 1994.

Moreover, it is necessary to have an additional and separate transfer authority from that provided for the rest of DoD for the same reasons that Congress initially established the program with a specific transfer authority. Congress originally established the program with specific transfer authority to take advantage of the unique, unforeseen (and unbudgeted) opportunities to reduce the threat of weapons of mass destruction in the former Soviet Union. The specific transfer authority reflected the high priority Congress placed on the Cooperative Threat Reduction program, as well as the uncertainties about how actual program requirements would be defined in agreements with the FSU states, how much such programs would cost, and how the program would be executed. In providing specific transfer authority, Congress also recognized that this was a unique Defense program and that DoD has limited general transfer authority, and many other unusually high, unforeseen, unfunded requirements.

Questions. For fiscal years 1992 and 1993 separately, please indicate: How much of the transfer authority has actually been used; of that actual amount transferred, how much has been obligated; how much has been proposed for use but not yet transferred; and what specific sources have been (1) proposed for reprogramming, (2) denied for reprogramming, and (3) actually reprogrammed.

Answer. For the FY 1992 Nunn-Lugar program, all $400.0 million has been proposed for obligation with notifications to Congress, using cash assets of the Defense Business Operations Fund

(DBOF). Of the total $400.0 million, $187.5 million has actually been transferred to appropriate accounts before the remaining $212.5 million in transfer authority lapsed at the end of FY 1993. As of May 6, 1994, $109.6 million has been obligated. While none of this action has been denied by the Congress, Congress did not extend the transfer authority which foreclosed the transfer of $212.5 million from the DBOF.

For the FY 1993 program, $89.8 million has been transferred to appropriate accounts for execution. Of that amount, as of May 6, 1994, $7.4 million has been obligated. Through a combination of Congressional notifications and the FY 1993 Nunn-Lugar reprogramming currently before Congress, $389.5 million, almost all $400.0 million of the FY 1993 transfer authority has been proposed for use, so $310.2 million is yet to be transferred. The following sources have been proposed to fund FY 1993 programs:

Source	*Amount (millions)*
DBOF—(Cash Assets)	58.5
APN—(A–6 Modifications)	48.5
RDT&E,N—(Systems Support Technology)	1.0
RDT&E,N—(Trident II)	1.9
RDT&E,N—(Satellite Laser Communications)	15.0
RDT&E,N—(Helicopter Development—Eng.)	5.0
RDT&E,N—(AV–8B Aircraft—Eng.)	1.5
MPAF—(Advanced Cruise Missile)	3.8
MPAF—(AMRAAM)	6.5
NGRE,D—(Navy Reserve FFG–7 Display System)	8.8
RDT&E,AF—(F–15A/B/C/D Squadrons)	7.6
RDT&E,AF—(Night Precision Attack)	14.0
RDT&E,N—(AFX)	19.9
RDT&E,AF—(Strategic Communications)	3.0
RDT&E,DA—(Superconducting Magnetic Energy Storage)	20.0
RDT&E,DA—(SOF Equipment and Technical Support)	5.5
APN—(F–18 Modifications)	22.5
APAF—(Strategic Communications)	10.0
PDA—(SOCOM Equipment and Technical Support)	11.1
MPMC—(Military Personnel, Marine Corps Underexecution)	17.0
RDT&E,A—(ASAT, ALSE AD, ALSE ED)	5.0
RDT&E,N—(T–45 Training System)	19.4
RDT&E,N—(Marine Corps Ground Combat/Support Arms)	5.9
RDT&E,AF—(Advanced Tactical Air Reconnaissance System)	17.2
RDT&E,DA—(Ballistic Missile Defense)	44.2
RDT&E,DA—(SOF Advanced Technology Development)	1.5
RDT&E,DA—(SOF Classified Program)	23.5
RDT&E,DA—(Multifunctional Information Distribution System)	6.0
RDT&E,DA—(Joint Remotely Piloted Vehicles)	12.9
APN—(EA–6B)	57.4
WPN—(Classified Program)	56.4
OPN—(Surface Tomahawk Support Equipment)	3.9
MPAF—(Air Launch Cruise Missile Modifications)	17.8
MPAF—(Advanced Cruise Missile Modifications)	4.9
PDA—(Rivet Joint (RC–135) Aircraft)	24.0
PDA—(SOF Aircraft Support)	5.2
PDA—(SOF Communications Equipment & Electronics)	5.8
PDA—(SOF Intelligence Systems)	2.5
PDA—(SOF Classified Program)	5.0

Of the above sources, the following were denied by the Congress:

APN—(A–6 Modifications)	48.5
RDT&E,N—(Systems Support Technology)	1.0
RDT&E,N—(Trident II)	1.9
RDT&E,N—(Satellite Laser Communications)	15.0
RDT&E,N—(Helicopter Development—Eng.)	5.0
RDT&E,N—(AV–8B Aircraft—Eng.)	1.5
MPAF—(Advanced Cruise Missile)	3.8
MPAF—(AMRAAM)	6.5

Source	Amount (millions)
NGRE,D—(Navy Reserve FFE–7 Display System)	8.8
RDT&E,DA—(Superconducting Magnetic Energy Storage)	20.0
RDT&E,DA—(SOF Equipment and Technical Support)	5.5
PDA—(SOF Equipment and Technical Support)	11.1
APN—(F–18 Modifications)	22.5
The following sources have been transferred to appropriate accounts for execution of FY 1993 programs:	
DBOF	10.0
RDT&E,AF—(F–15A/B/C/D Squadrons)	7.6
RDT&E,AF—(Night Precision Attack)	14.0
RDT&E,N—(AFX)	19.9
RDT&E,AF—(Strategic Communications)	3.0
APAF—(Strategic Communications)	10.0
MPMC—(Military Personnel, Marine Corps Underexecution)	17.0
PDA—(SOF Equipment and Technical Support)	[1] 8.3

[1] $8.3 million in PDA (SOF Equipment and Technical Support) was objected to by the House Appropriations Committee subsequent to transfer. The FY 1993 reprogramming provides a substitute source.

COSTS FOR DISPOSAL OF WEAPONS OF MASS DESTRUCTION

The prepared statements indicate that this program "cannot accomplish the full task in any one of the program areas for any of the FSU states. For example, in the area of chemical demilitarization alone, cost estimates for disposing of Russian chemical warfare stocks and munitions range as high as $8 billion."

Question. Assuming that the states of the former Soviet Union wished to do so, how much would you estimate the total cost to be of destroying their entire chemical, nuclear, and biological weapons stockpile and building storage facilities for any radioactive materials?

Answer. The Russian Federation is the only former Soviet Union state that has declared a chemical weapons stockpile. Some Russian officials have estimated the cost of destruction of the declared 40,000 agent tons of CW stocks could be as high as $10 billion. As part of the U.S. CW destruction assistance to Russia, a comprehensive CW destruction plan is being developed. This plan will provide the detailed information required to determine the resource requirements for destruction of the Russian declared CW stocks.

To date, no former Soviet Union states have declared any biological weapons stockpiles. In April 1992, President Yeltsin admitted that the Russian Federation had a BW program that violated the Biological Weapons Convention and issued a decree prohibiting such activities. Russia has not declared a BW stockpile.

We have no easy way of estimating the cost of the complete dismantlement of the Russian nuclear arsenal. A rough estimate, based on U.S. experience is that dismantlement costs for the total FSU nuclear arsenal could be $1–2 billion or more. The safe and secure storage of the nuclear materials would add to that estimate.

Question. One of the prepared statements also indicates that the Five Year Defense Plan includes $400 million annually to continue these programs. Do you intend to request funds indefinitely?

Answer. No, DoD does not intend to request funds indefinitely. Funds were included in the Five Year Defense Plan to ensure that as the program continued, the Department had planned for estimated program requirements in the appropriate account and would not have to take funding from critical readiness related programs. There is nothing automatic about the $400 million planning figure.

As this program was initiated by Congress, the Department is just beginning to fully assess the long-term requirements and benefits of this program. Funds will not be requested indefinitely, but budget requests will be adjusted to reflect program objectives, implementation progress and new requirements as the program is further defined.

PROCESS OF INITIATING AGREEMENTS

Question. The process by which you sign agreements, obligate funds and accomplish specific projects is not entirely clear. In some cases it appears that the President may sign an agreement to provide certain kinds of assistance but there is no detailed list of tasks and dollar amounts that has been agreed upon by both countries. Has the President delegated the power to make agreements which commit the US to use these funds?

Answer. Yes. On January 19, 1994, the President delegated the responsibilities and duties under Section 1203(a), 1204, 1206 and 1207 of the Cooperative Threat Reduction Act of 1993, Title XII of the National Defense Authorization Act for Fiscal Year 1994, Public Law 103–160 to the Secretary of Defense. The responsibilities and duties under Section 1203(d) relating to certification were delegated to the Secretary of State. The Secretary of Defense cannot exercise his delegated authority to provide assistance to these countries unless the Secretary of State has exercised his authority in certifying these countries as eligible to receive the assistance.

Thus, there are five steps in providing Cooperative Threat Reduction assistance: (1) making the required certifications; (2) prior notification to Congress of proposed obligations for specific projects; (3) subsequent negotiation and signature of agreements with the FSU states; (4) implementation of the agreements through requests for proposals, awarding contracts, delivering goods and services; and finally, (5) auditing and monitoring the assistance provided.

Question. In other international programs that DoD has been involved in, the appropriation of funds seems to occur much later. For example, when the President signed agreements for SALT, START, or INF, no appropriations were requested until there were specific and detailed projects which required the funds. Why do you request an appropriation so much earlier in the process for this program.

Answer. Unlike SALT, START or INF Treaties which were ratified by Congress, Congress provided specific authority in advance for the CTR program and established specific procedural requirements for these future activities. This authority is the basis for the provision of CTR assistance to the states of the former Soviet Union and thus, the international agreements under which DoD provides such assistance. Umbrella agreements which each state establish the legal framework, terms and conditions for the provision of CTR assistance and implementing agreements establish the specific project details and identify the amount of assistance to be provided.

To ensure appropriate oversight, Congress directed that no funds could be obligated for CTR assistance until 15 days after a notification of proposed obligations report is submitted to Congress defining the amount and describing the type of assistance to be provided. Thus, DoD obligational authority is not available until after Congress has been notified of proposed obligations, and must then await actual implementation of the agreements, a process which can involve a substantial amount of time. As the implementing agreements commit the US to provide assistance and result in the obligation of funds, these agreements are directly linked to the obligational authority available. This is not the case with Treaties which Congress ratifies and then appropriates funds to carry out. Moreover, SALT, START and INF are not assistance programs to other countries requiring negotiation of individual implementing agreements.

UKRAINE PARTICIPATION

Question. In your prepared statements, you indicate that the Ukraine has agreed to denuclearize completely and remove all nuclear weapons from its territories within a short period of time.

Although the President of Ukraine signed such an agreement, doesn't he have to get legislative agreement before the agreement has any legal force in the Ukraine?

Answer. On February 3, 1994, the Ukrainian Parliament ("Verkhovna Rada") voted to remove its previous reservations to the START I treaty and the Lisbon Protocol. The January 14 Trilateral Statement reaffirms the pledge made by President Kravchuk contained in a letter associated with the Lisbon Protocol that Ukraine will ensure the elimination of all nuclear warheads and strategic offensive arms on its territory. In addition, by unconditionally ratifying START I, including the Lisbon Protocol, Ukraine is obligated to accede to the Nuclear Non-Proliferation Treaty as a non-nuclear weapon state in the shortest possible time, and the Ukrainians have told us that the Rada could vote its approval of NPT accession in the near future. While the Trilateral Statement does not, and was not intended to, legally bind the parties, it clearly expresses the shared political intent of and cooperation among the three Presidents to facilitate the entry into force of the START I Treaty, which of course will be legally binding on the parties.

Question. The Ukrainian leadership has consistently expressed concern over potential instability in Russia and the potential for serious clashes over mutual borders and over the Crimea. One of the conditions that they clearly want is for the U.S. or NATO to guarantee the sovereignty of the Ukraine's borders. Have we given or even implied any such guarantee as a condition of this or any other agreement with Ukraine?

Answer. The sovereignty and territorial integrity of Ukraine are of important interest to the United States. As indicated in the Trilateral Statement, the U.S., the Russian Federation, and United Kingdom, as depositary states of the Nuclear NonProliferation Treaty (NPT), will extend security assurances to Ukraine once START I enters into force and Ukraine accedes to the NPT as a non-nuclear weapon state. These assurances are drawn from the principles of the CSCE Final Act and commitments the U.S. has previously made to non-nuclear weapons states parties to the NPT. The United States, with the other depositary states, will seek immediate United Nations Security Council action to provide assistance to Ukraine should it become a victim of aggression or threat of aggression involving nuclear weapons. Further, we will consult with Ukraine if a question about any of these commitments arises. We have not, however, extended a security guarantee of Ukrainian territorial integrity.

Question. One of the prepared statements indicates that these funds "will have supported or assisted the reduction of a large number of strategic weapon systems under the START I and II treaties."

(a) Does this mean that if these funds were not available, that the states of the former Soviet Union would not have lived up to the terms of these treaties?

(b) If they would not live up to terms of the START Treaty, why do you believe that Ukraine will live up to the recent agreement to get rid of all of its nuclear weapons?

Answer. (a) All of the START I parties are committed to fulfilling their obligations under START I and the Lisbon Protocol. However, severe economic problems in each of these stares may have made it difficult for them to both meet the START requirement to eliminate strategic offensive arms and move forward with economic reform. By providing assistance in eliminating these strategic offensive arms, we not only ensure uninterrupted progress or even acceleration in the elimination of these systems, but also that meeting START commitments does not interrupt the progress of these nations toward establishing a system of democracy and free enterprise. Moreover, it is unclear whether these states, in particular Ukraine, would have committed themselves fully to meeting the timeless of START I, the Lisbon Protocol, and the Trilateral Statement without U.S. involvement and financial assistance.

The same financial considerations will apply to ensuring that timely START II reductions take place once that Treaty is ratified and enters into force. Indeed, the START II Treaty explicitly recognizes that U.S. aid to Russia for eliminating the strategic offensive arms could allow the sides to agree to accelerate the elimination of systems under the Treaty.

(b) President Kravchuk has expressed a strong commitment to fulfilling the terms of the START I Treaty and Lisbon Protocol. After taking into account the Trilateral Statement signed by President's Clinton, Yeltsin and Kravchuk, the Ukrainian Rada has now ratified START I, including the Lisbon Protocol, without conditions. Implementing of the Trilateral Statement has already begun with the first two shipments of warheads from Ukraine to Russia and the first delivery of fuel rods to Ukraine from Russia. We believe that Ukraine is committed both to the START I Treaty and to the Trilateral Statement.

DEFENSE CONVERSION

Question. According to the budget justification material, you plan to establish the Defense Diversification Enterprise Fund in fiscal year 1994 "to the run by a private board of directors". What is the enterprise fund and who will be on the board of directors?

Answer. While FY 1994 legislation provides DoD with the authority to make grants as well as to provide goods and services, that authority alone is not sufficient to permit us to undertake the activities that would best facilitate demilitarization of the economies of the former Soviet Union and the development of long-term economic ties to the U.S. industry. The enterprise Fund we are establishing will address these limitations and provide us with an additional mechanism for implementing our defense conversion assistance.

The Fund will be a private, non-profit organization, governed by a Board of Directors and managed by a staff with demonstrated experience and expertise in the private sector, particularly as it relates to the defense sector and opportunities for defense conversion. We are looking to appoint investment bankers, venture capitalists and others who can identify viable defense conversion projects and encourage joint ventures and private capital investment that will lead to long-term business relationships.

The Fund will determine where to invest the capital provided to it, and will be authorized not only to provide goods and services, but also to make loans or grants, provide collateral for ExIm guarantees, take equity positions, and provide venture capital along with private industry for joint ventures. This will allow the Fund to leverage USG funds to promote additional private investment. The Fund will invest exclusively in projects to convert the defense sector of the NIS industrial base, and will focus in particular on those industries that produce weapons of mass destruction, including strategic offensive arms and chemical weapons, and the components for such weapons. These are generally mid-to-large size enterprises.

The Board of Directors will be selected by the Secretary of Defense, with the approval of the President.

Question. Who will make the decisions to spend the funds allocated to the enterprise fund—the private board of directors or U.S. government officials?

Answer. Subject to general policy guidance provided by the Secretary of Defense, the Fund, through its Board of Directors and expert staff, will determine where to invest the capital provided to it. There will be, of course, reporting and audit provisions to ensure that U.S. government assistance is being properly utilized.

Question. What is the basis for your proposal to give up the grants control process to non-governmental officials?

Answer. The Entire Fund will complement other existing funds such as the Russian-American Enterprise Fund and the Fund for Large Enterprises, but will be unique in its focus on converting defense industries, particularly those associated with weapons of mass destruction. The Enterprise Fund will be a private, non-profit organization, governed by a Board of Directors and managed by a staff with demonstrated experience and expertise in the private sector, particularly as it relates to the defense sector and opportunities for defense conversion. As such, the Fund will have the characteristics of a private sector venture capital fund, designed to identify promising defense conversion projects and move flexibly and responsively to determine where to invest the capital provided to it. The Fund will thus be run as a business. The Department of Defense and other federal agencies do not have the business and investment expertise to administer the Fund in this manner. Unlike federal agency grants, the "grants" made by the Fund may carry conditions, entail equity positions by the Fund, and involve repayment with interest. We are confident that the reporting and audit provisions we are establishing will provide oversight control to ensure that U.S. government assistance is being properly utilized.

Question. Is there no federal agency with the expertise to make these grants?

Answer. As a private, non-profit organization, the Enterprise Fund will be managed with the characteristics of a venture capital fund. Since federal agencies are managed differently, and do not depend for their survival on the success of their investment decisions, their grants will not be comparable to grants made by the Enterprise Fund. Unlike federal agency grants, the "grants" made by the Fund may carry conditions, entail equity positions by the Fund, and involve repayment with interest. Moreover, the Fund will be governed by a Board of Directors and managed by a staff with demonstrated experience and expertise in the private sector, particularly as it relates to the defense sector and opportunities for defense conversion. We intend to appoint industrialists and others who can identify and encourage viable defense conversion projects. Other Federal agencies do not have the mix of personnel focused on the demilitarization of the economies of the former Soviet Union and the development of long-term economic ties to U.S. industry. For these reasons the Enterprise Fund is the more appropriate mechanism for assisting defense conversion in the former Soviet Union.

Question. There are several U.S. organizations—such as the National Academy of Sciences or the National Science Foundation—with the necessary technical and linguistic capabilities and have been vehicles for government grants in the past. Why is it necessary to establish a new Bureaucracy?

Answer. We have been limited legislatively in the forms of defense conversion assistance that we could provide to goods and services, which really only provide one-time assistance. Existing organizations cannot now do many of the things that would help to establish the long-term ties between American businesses and former defense enterprises that will be critical to demilitarizing, civilianizing and reforming the economies of the former Soviet Union and helping U.S. business. While it is true that the FY 1994 legislation provides DoD with the authority to make grants as well as to provide goods and services, that authority alone is not sufficient to permit us to undertake the activities that would further promote demilitarization of the economies of the former Soviet Union and long-term economic ties to U.S. industry. We have proposed the establishment of the Enterprise Fund to address these structural problems. The Enterprise Fund will be a private, nonprofit organization, governed by a Board of Directors and managed by a staff with demonstrated experience and expertise in the private sector, particularly as it relates to the defense sector and opportunities for defense conversion. As such, the Fund will have the characteristics of a private sector venture capital fund, designed to identify promising defense conversion projects and move flexibly and responsively to determine where to invest the capital provided to it. The Department of Defense and other federal agencies do not have the business and investment expertise to administer the Fund in this manner.

In addition, other U.S. agencies do not contain the mix of investment bankers, venture capitalists, and other personnel with demonstrated experience in the private sector who will be selected to staff the Fund and provide the level of expertise needed to identify viable defense conversion projects and encourage joint ventures and private capital investment that will lead to long-term business relationships.

NATIONAL ACADEMY OF SCIENCES

Question. The National Academy of Sciences has had over 30 years of continuous cooperation with scientists and engineers in the USSR and its successor states. Last year DoD and the Academy were in the process of negotiating an agreement to provide funding for the Academy to continue and expand its efforts. Since the Academy already has access to both linguistic and technical expertise, the Committee directed that $10 million of the $400 million provided in the fiscal year 1994 be reserved for this effort. How much of the $10 million has been provided?

Answer. DoD is and the National Academy of Sciences are developing a program plan outlining potential Academy support to the Cooperative Threat Reduction program. Several areas have been discussed and the Academy, with assistance from the Defense Nuclear Agency (DNA), has prepared a draft for DoD review. Based on the results of that review, the Academy will be asked to provide a final program plan, including agreed costs, for funding via a contract with DNA.

Question. DoD is in the process of establishing International Science and Technology Centers in several of the former Soviet Republics. DoD is also considering establishing a private organization to provide grants to organizations and individuals in the former Soviet Union.

a. Are you aware that existing federal law and Executive Order would already permit the Academy to perform these functions without creating new bureaucracies?

b. Since it has the expertise and an historical involvement with the former Soviet Union, is there any reason DoD could not use the Academy for either sponsoring the Science Centers or as a vehicle for awarding defense conversion grants in the former Soviet Union?

Answer. The FY 94 Defense Authorization Act provides authority for the President to designate and provide grants to a Demilitarization Enterprise Fund that will provide financial support for the demilitarization of industries and conversion of military technologies and capabilities into civilian activities in the countries eligible to receive Nunn-Lugar assistance. The fund will be a privately managed non-profit institution, initially capitalized with Nunn-Lugar funds, that will be governed by a Board of Directors and managed by a staff with demonstrated experience and expertise in the private sector, particularly as it relates to the defense sector and opportunities for defense conversion. We are looking to appoint experienced investment bankers, venture capitalist and others who can identify commercially viable defense conversion projects and encourage joint ventures and private capital investment that will lead to long-term business relationships. This traditionally has not been a function of the National Academy of Science.

The International Science and Technology Center (ISTC), headquartered in Moscow, began operations March 2, 1994. The objective of the ISTC is to give weapons scientists and engineers, particularly those who possess knowledge and skills related to weapons of mass destruction or missile delivery systems, opportunities to redirect their talents to peaceful activities. Representatives of the ISTC's founding Parties—the U.S., Japan and the European Community and the Russian Federation—met 17–18 March 1994 to approve the first round of funding for ISTC projects. A total of $11.6 million was committed to 23 projects involving more than 600 Russian scientists and engineers. Because the ISTC is a multi-national organization with a professional staff and governing board that includes representatives from each of the four countries, DoD could not designate a U.S. organization, such as the Academy of Sciences, to operate the Center.

Question. For the record, it would be appreciated if DoD would ask the National Research Council (NRC)—which is the operating arm of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine—to respond to the following questions in writing: a. What experience and expertise does the NRC have which might be of assistance to DoD in this area? b. Could the NRC, with appropriate funding from DoD, be responsible for the establishment and operation of the International Science Centers that DoD is proposing to create in the former Soviet Union?

[CLERK'S NOTE: DoD did not provide the requested response from the NRC. Instead, the following DoD response was provided.]

Answer. The International Science and Technology Center (ISTC), headquartered in Moscow, began operations March 2, 1994. The objective of the ISTC is to give weapons scientists and engineers, particularly those who possess knowledge and skills related to weapons of mass destruction or missile delivery systems, opportunities to redirect their talents to peaceful activities. Representatives of the ISTC's founding Parties—the U.S., Japan and the European Community and the Russian Federation—met 17–18 March 1994 to approve the first round of funding for ISTC projects. A total of $11.6 million was committed to 23 projects involving more than 600 Russian scientists and engineers. Because the ISTC is a multi-national organization with a professional staff and governing board that includes representatives from each of the four countries, DoD could not designate a U.S. organization, such as the Academy of Sciences to operate the Center.

The same is true for the Science and Technology Center in Ukraine (STCU) where Canada and Sweden have contributed funds and will be represented on the professional staff and governing board. The Government of Ukraine has signed the executive order necessary to allow the STCU to enter into force and we are awaiting receipt of a diplomatic note that will allow entry into force. We expect that the STCU will become operational in the near future.

Question. If the Defense Diversification Enterprise Fund is not created, could the NRC, with appropriate funding from DoD, be responsible for providing such grants to organizations and individuals in the former Soviet Union?

Answer. We expect to capitalize the Fund in June, and we expect the Fund's first investment could be made in the August-September time frame. Much of our future defense industry conversion assistance will flow through the Fund.

[CLERK'S NOTE.—End of questions submitted for the record.]

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